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ABSTRACT

The study compared the motor activities and environmental interactions of 36 sighted, partially sighted, and blind children (7 to 13 years old) during unstructured play. Objectives were to assess motor proficiency level; to establish frequency and kind of gross motor, manipulative self stimulation, and social/play behaviors; and to assess use of the environment. Ss were observed in their natural play environments. A time sampling technique was used to observe each S group over a 6 week period for a total of 30 ten second observations per child. Selected non sight dependent items from the Bruininks-Oseretsky Test of Motor Proficiency were administered to each S. Results indicated significant differences among Ss in motor proficiency level, gross motor, self stimulation, and social/play behaviors. Correlations demonstrated that the higher the motor proficiency level the greater the frequency, diversity, and complexity of gross motor behavior. There were no significant differences in manipulative behaviors. Under the environment category, there were significant differences in the way the children used the available space and equipment by sight, age, and sex. Data showed consistent patterns for all groups in exhibiting the most complex behaviors on the most complex equipment. Overall analyses suggested that the developmental delays seen in the visually impaired children may not result from their handicapping condition alone. Evidence suggested some delay attributed to lack of experience, particularly in gross motor interactions with the environment. Findings pointed to an environmental intervention strategy which would involve the accessibility of complex and appropriately designed environments and the training of personnel in use of the environment as an active tool in achieving educational goals for each child. (Author/SB)

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COMPARISON OF ENVIRONMENTAL INTERACTIONS AND MOTOR ACTIVITY OF VISUALLY HANDICAPPED AND SIGHTED CHILDREN

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November 1980

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ABSTRACT

COMPARISON OF ENVIRONMENTAL INTERACTIONS AND MOTOR ACTIVITY OF VISUALLY HANDICAPPED AND SIGHTED CHILDREN

Lynda H. Schneekloth and Diane B. Day

The purpose of this study was to compare the motor activities and environmental interactions of sighted and visually impaired children during unstructured play. More specifically, the objectives were: (1) to assess motor proficiency level; (2) to establish frequency and kind of gross motor, manipulative, self-stimulation and social/play behaviors; and (3) to assess use of the environment. Twelve blind, partially sighted and sighted children (N=36), ages seven years to thirteen years, were observed in their natural play environments. A time sampling technique was used to observe each subject group over a six week period for a total of thirty, ten-second observations per child. Selected non-sight dependent items from the Bruininks-Oseretsky Test of Motor Proficiency were administered to determine the motor proficiency level of each child.

Results indicate significant differences (at .05 level) among blind, partially sighted and sighted children in motor proficiency level, gross motor, self-stimulation and social/play behaviors. The correlation between groups for motor proficiency and gross motor behaviors demonstrated that the higher the motor proficiency level the greater the frequency, diversity and complexity of gross motor behavior. There were no significant differences in manipulative behaviors. Under the environment category, there were significant differences (at .05 level) in the way the children used the available space and equipment by sight, age and sex.

The data showed consistent patterns for all groups in exhibiting the most complex behaviors on the most complex equipment. Overall analyses suggest that the developmental delays seen in the visually impaired children may not result from their handicapping condition alone. Rather, the data suggests that some of the delay can be attributed to lack of experience, particularly in gross motor interactions with the environment. The lack of opportunity and practice of such skills points to an often overlook intervention strategy: <u>environmental interventions</u>. Such a strategy would involve (1) the accessibility of complex and appropriately designed environments; and (2) the training of personnel in use of the environment as an active tool in achieving the educational goals for each child.

TABLE OF CONTENTS

		Page
ABSTRACT		i
ACKNOWLEDGEMENTS		ix
I.	PROBLEM STATEMENT	3
II.	GOALS AND OBJECTIVES	9
III.	BACKGROUND	13
	A. Visual Impairment	15
	B. Play and the Visually Impaired Child	16
	C. Play Environments	21
IV.	METHODS AND PROCEDURES	27
	A. Methodological Issues and Limitations	29
	B. Subjects	31
	C. Data Variables	35
	D. Methods	37
	E. Analysis	45
V.	RESULTS	51
	A. Motor Proficiency	53
	B. Behaviors	58
	C. Environment	86
VI.	DISCUSSION	97
	A. Motor Proficiency	99
	B. Behaviors	101
	C. Environment	123
VII.	CONCLUSIONS AND RECOMMENDATIONS	149
	A. Summary	151
	B. Summary Discussion of Research Findings	154
	C. Methodological Concerns	157
	D. Conclusions and Recommendations	160
APPENDICES		163

LIST OF TABLES

Table		Page
1.	Sex and Chronological Age of Subjects	32
2.	Organization of Observations	39
3.	Schedule of Data Collection	41
4.	Motor Proficiency Raw Scores and Age Equivalent Scores for each Subtest	55
5.	Motor Proficiency- Total Average Age for Subtests	56
6.	Motor Proficiency- Total Raw Score for Subtests	56
7.	Gross Motor Behaviors	59
8.	Gross Motor Behaviors- Frequency and Percent of Behaviors with Significant Chi Squares	60
9.	Gross Motor Behaviors- Diversity	61
10.	Gross Motor Behaviors- Diversity and Frequency of Correlated to Motor Proficiency Subtest 2 and Subtest 4 Using N = 36	62
11.	Gross Motor Behavior- Complexity	64
12.	Gross Motor Behaviors- Active	65
13.	Gross Motor Behaviors- Passive	66
14.	Manipulative Category and Subgroups of Behaviors	68
15.	Manipulative Behaviors- Frequency and Percent of Observed Behaviors with Significant Chi Squares	69
16.	Manipulative Behaviors- Diversity	71
17.	Total Manipulative Category and Manipulative Gross Behaviors- Frequency Correlated to Subtest 4, Strength	72
18.	Manipulative Category and Manipulative Fine Behaviors- Frequency Correlated to Subtest 8, Upper Limb Speed and Dexterity	73
19.	Self-Stimulation- Gross Motor Behaviors	75
20.	Self-Stimulation- Frequency and Percent of Observed Gross Motor Behaviors with Significant Chi Squares	75

Table		Page
42.	Self-Stimulation Behaviors- Frequency and Percent	113
43.	Stereotypic Behavior With and Without Environmental Manipulation	114
44.	Contact With Self- Frequency and Percent	115
45.	Social and Play Behaviors- Frequency and Percent	117
46.	Social Contact- Level of Interaction	118
47.	Available Equipment	124
48.	Location- Frequency and Percent	128
49.	Gross Motor Behavior/Location- Frequency and Percent	132
50.	Relationship to Equipment- Frequency and Percent	133
51.	Gross Motor Behavior/Equipment- Frequency and Percent	134
52.	Gross Motor Behavior/Equipment- Significant Chi Squares	140
53.	Complexity of Gross Motor Behaviors/Complexity of Equipment	142

Jul 7

Table		Page
21.	Self-Stimulation- Fine Motor Behaviors	76
22.	Self-Stimulation- Frequency and Percent of Observed Fine Motor Behaviors with Significant Chi Squares	78
23.	Contact with Body and Clothes	79
24.	Physical Contact- Fine and Gross Motor Behaviors	82
25.	Social Contact	83
26.	Social Contact- Frequency and Percent of Observed Behaviors with Significant Chi Squares	84
27.	Contact with Others	85
28.	Location- Significant ANOVAS by Sight with Mean and Standard Deviation	88
29.	Location- Significant ANOVAS by Sex with Mean and Standard Deviation	89
30.	Location- Significant ANOVAS by Age with Mean and Standard Deviation	89
31.	Equipment Use	90
32.	Equipment Use- Frequency and Percent	91
33.	Use of Equipment by Age Group	92
34.	Boundary Use	92
35.	Object Use	93
36.	Motor Proficiency- Age Average Score	99
37.	Gross Motor Behaviors	101
38.	Gross Motor Behaviors- Active and Passive	105
39.	Manipulative Behaviors-Frequency and Percent	108
40.	Manipulative Behaviors - Four Most Frequently Exhibited	109
41.	Self-Stimulation Behaviors	112

FIGURES

		Page
Figure 1	Playground at the Virginia School for the Deaf and Blind, Staunton, Va.	33
Figure 2	Playground at the Blacksburg New School, Blacksburg, Va.	34
Figure 3	Observation Checklist	36
Figure 4	Chart - Gross Motor Behaviors	63
Figure 5	Chart - Manipulative Behaviors	70
Figure 6	Chart - Self-Stimulation Behaviors	77
Figure 7	Chart - Social and Play Behaviors	80
Figure 8	Social Contact - Level of Interaction	119
Figure 9	Location - Use of Space	129
Figure 10	Gross Motor Behaviors/Location	131
Figure 11	Equipment Use/Sight	137
Figure 12	Complexity of Gross Motor Behaviors/ Equipment	143

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Lynda H. Schneekloth

Diane Day

I. PROBLEM STATEMENT

There has been a recognition by policy makers and educators that all handicapped children need and have a right to the same kind of play and recreational experiences that "normal" children have. In a report by the National Recreational and Park Association and BEH (April 1976), it was suggested that activity participation may be critical to cognitive, affective, social, and motor development, and is requisite to "achieving normalization, deinstitutionalization, and mainstreaming" (p. 8). Public awareness and policy responses continue to grow (PL. 94.142), and the guarantees to access mandated (PL. 93.112, sec. 504). Yet we are only beginning to understand how such services and opportunities can be appropriately delivered. (Fraiberg 1977, Rarick 1976).

One basis for this recognition is research and theory which proposes that play and exploration of the young is the primary mode for achieving healthy growth and development. Recent research has pointed out that almost all learning for children occurs in play. Lack of play experiences has resulted in delays in motor development, cognitive development and social skills.

Play occurs in a context and for young children it is often dependent on appropriate and responsive physical environments. The natural environment remains one of the most stimulating and satisfying playgrounds for children, but is becoming less accessible because of urbanization and sub-urbanization. Such trends have increased the importance of specifically designed play areas. The support of growth and development through

the provision of appropriate environments offers the unique opportunity to manipulate the environment and not the child to achieve specific educational goals.

The recent design of play environments for the handicapped child has pointed to a new means of intervention, i.e., the structuring of experiences through the provision of appropriate environments which are exciting, physically safe and psychologically secure. (Shaw 1976, Moore 1977, Lady Allen 1974, Bowers 1975) Much of the work on play environments for handicapped children can be translated into environments for visually handicapped children. However, most of the environments are dependent upon vision for attraction, stimulation, safety, mobility, and orientation. (See, however, Olsen 1976, Cross 1969). For this reason, research is required in order to assess the impact of a visual handicap on the free interaction within a play environment.

Of the 3,721,808 handicapped children currently receiving special education and related services, 38,464 are blind or visually impaired. (BEH Data Notes, Sept. 1977). The kind of experiences provided in the context of play, i.e., hands-on, direct interactions, are especially critical to these children who must obtain all of their information about the world through senses other than sight. Without ample opportunities for play, the visually handicapped child is deprived of social, cognitive and motoric benefits.

Because play experiences are so critical to the visually impaired child, it is ironic that they appear to have less access to them. This deficit occurs for a number of reasons: (1) lack of stimulating environments; (2) overprotection by adults; (3) lack of motivation to move out and explore because there is no continuous visual stimulation to entice them; and (4) fear based on real danger of injury.

If play experiences are critical for healthy growth and development, there are at least two intervention strategies which have potential for enhancing the benefits of play for children with visual impairments:

1. The design of appropriate play environments: environments that motivate the child to interact with the surroundings with minimal adult intervention.

2. The training of service providers and visually impaired children: increasing the environmental competence of both groups to more clearly comprehend

how to use and change settings to achieve desired goals. (Steele 1973)

Before either design or training intervention programs can be established, baseline data are required. Data are needed to determine what visually impaired children are currently doing in existing play environments, what capacities they have for play activities, and how they compare with sighted children.

Summary

> The implications for mobility are clear; blind individuals should receive, beginning as early in their blind life as possible, varied and intensive stimulation of their remaining sense modalities. If these modalities are adequately exercised, they will provide an adequate perceptual basis for mobility. If they are not, it is unreasonable to expect the individual to become effectively mobile. (Warren and Kocon 1974, pp. 200-201)

If we accept the axiom that "the quality of life is... conditioned by the quality of behavior settings available," (Gump 1974, p. A-4) and that the quality of life for children is in part dependent upon the availability of exciting, fun, and interactive play environments, then it is incumbent upon us as providers to be informed of what kinds of environments are best suited for specific developmental needs for specific populations.

Blind and visually impaired children have a severe limitation in their ability to interact with their environments and should be given every chance to explore and play freely in a place that stimulates and supports their individual needs. It is anticipated that data from this research will help parents, teachers and designers to develop appropriate programs using the environment as the vehicle for intervention. Such strategies should greatly facilitate the development of mobility and social skills required for independence for the visually impaired.

II. GOALS AND OBJECTIVES

GOAL STATEMENT

To compare motor activity and environmental interactions of blind, partially sighted and sighted children during unstructured play in an outdoor playground.

OBJECTIVES

1. To assess the motor proficiency level of the three groups of children to determine relationships between ability and behaviors exhibited during unstructured play.

2. To establish and compare frequency and kind of behaviors exhibited by blind, partially sighted and sighted children during unstructured play. Specifically, categories of behavior observed were:

   a. Gross motor behaviors
   b. Manipulative behaviors
   c. Self-stimulation behaviors
   d. Social and play behaviors

3. To assess the use of the environment by blind, partially sighted and sighted children during unstructured play. Specifically,

   a. Use of space - location
   b. Use of environmental components - equipment and objects.

III. BACKGROUND

A. VISUAL IMPAIRMENT

B. PLAY AND THE VISUALLY IMPAIRED CHILD

1. Motor Passivity
2. Stereotypic Behaviors
3. Environmental Interactions

C. PLAY ENVIRONMENTS

III BACKGROUND

A. VISUAL IMPAIRMENT

It is difficult to speak of general characteristics of visually handicapped children because of the heterogenity of the population (Jastrzembska 1977). However, one condition is universal and that is the inability to use, either totally or partially, the sense that most of us use for 80% of our information about the world. Yet research has established that these children must learn about the environment and their world through the same structures as all children, although they must accomplish this task through other sense modalities.

> Vision provides a continuous, rich, consistent, precise, and reliable source of information to help (a child) orient to and identify objects and people, to regulate his own motor behavior, and to provide an overall organization of space. The question for the blind is then, not only how well the nonvisual senses can perform the functions that they serve for the sighted child but also to what extent the nonvisual sense can substitute for the functions that vision serves for the sighted child... (Warren 1977, p. 60).

A large number of children defined as legally blind by the American Printing House for the Blind do indeed have varying degrees of vision. Natalie Barraga has done extensive work on the visually impaired and suggests that "all children with low vision suffer from lack of visual stimulation and may need to be won over to the 'world of seeing.'" (Barraga 1977, p. 6) She has suggested a range of experiences and visual

stimulation which can encourage such a child to use what vision he has to facilitate the educational and mobility goals.

B. PLAY AND THE VISUALLY IMPAIRED CHILD

Play and exploration of the environment are critical for the healthy growth and development of all children. There is no evidence to suggest that the play and exploration needs for blind and visually impaired children are any different from those of sighted children.*

Fraiberg's (1977) study on blind infants demonstrates that development proceeds virtually identically for at least the first six months of life. However, a lag emerges at the point of self-initiated mobility. The external stimulation provided by sight which motivates a sighted child to crawl and reach out is not perceived by the blind or visually impaired.

This developmental lag has been noted by many researchers. (Fraiberg 1977, Warren 1977, Burlingham 1961, 1965) It has been suggested that the lag may be attributed to more than lack of sight and probably includes a deficiency in total stimulation of all sense modalities.

> It is, of course, not blindness alone that closes the world for the child but insufficiency in the stimuli for tactile-kinesthetic-auditory function in the early years. (Fraiberg 1977, p. 9)

Experience and research have taught us that the notion of sensory compensation is a myth. The other senses do not automatically take over if vision is impaired. Children with visual handicaps must be given opportunities for intensive stimulation and training so that other senese can provide them with sufficient information with which to understand their world.

*See Appendix A for more extensive Review of Literature.

This research has focused on three characteristics of visual impairment which can be potentially impacted through the manipulation of the physical environment:

1. Motor passivity - the apparent unwillingness to move out into the environment to explore which limits development of spatial awareness, and movement and orientation skills.

2. Stereotypic behaviors - self manipulation rather than environmental manipulation.

3. Lack of environmental interactions and play - the unwillingness to (a) engage in an active relationship with the environment, through gross motor and manipulative explanations and (b) use the environment for props in social and fantasy play.

1. Motor Passivity

The successful independence of a blind individual is related to his ability to move and orient himself through the environment. Without adequate motor skills and sensory awareness, effective mobility becomes improbable; without experience, both through training programs and play, such skills do not automatically develop (Hayes 1933; and Rice 1970).

It is noted that many visually impaired children tend to be more passive than sighted children of the same age. The implications for such passivity and lack of normal movement experiences becomes critical when we recognize that movement and direct interaction with the environment are the principle ways available to the blind child to integrate his comprehension of the world.

Lack of motivation may not be the basis for passivity. Indeed, it may be that the motor passivity, or lack of normal movement experiences that is seen in many blind children, is due not to an absence of motivation for movement, but rather to strong inhibitions of normal tendencies for movement. (Burlingham 1965) The child is simply protecting himself by not moving around, and under conditions where he is sure that the environment is safe, he will engage in normal motor activity. Nevertheless, motor passivity is critical if one is to

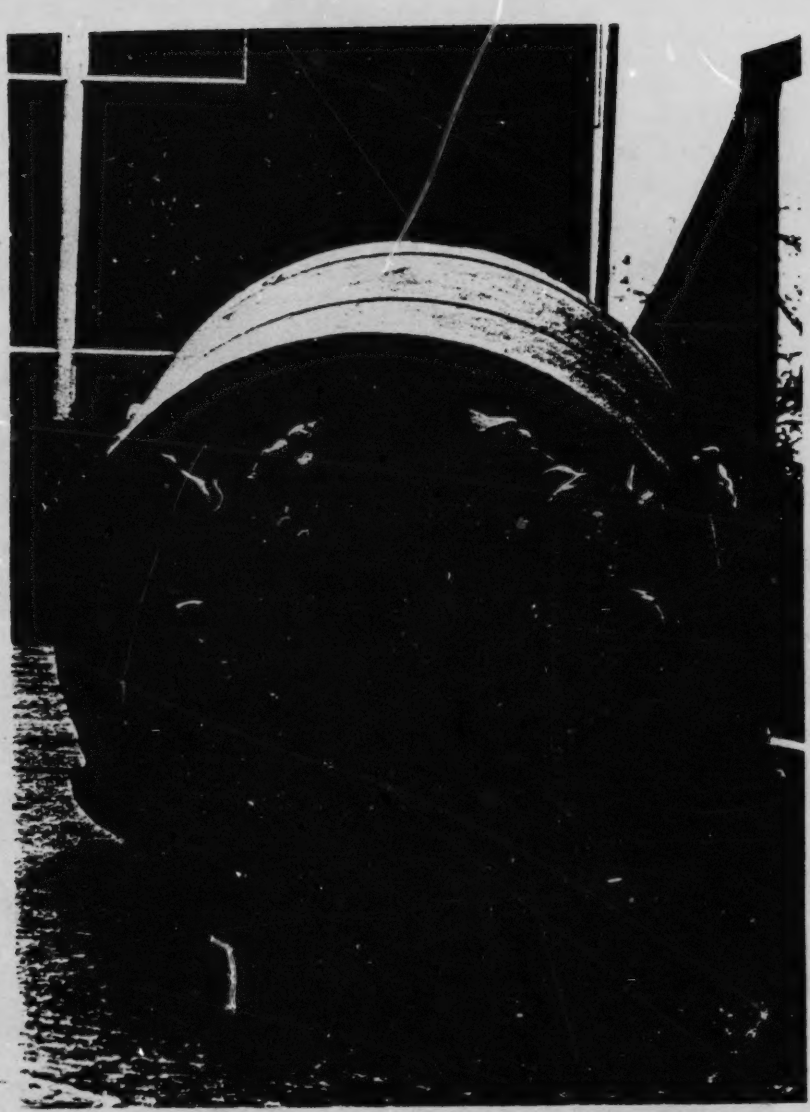
seriously consider the hypothesis that it is motor activity, not vision, that provides the integrating bridge between the other senses. (Jones 1975)

2. Stereotypic Behaviors

The phenomena of stereotypic behaviors (blindisms) in blind children is a subject of concern partly because of the interference of such activities in successful social interaction. Stone (1964) and Smith et al (1969) suggest that these behaviors represent attempts to increase the general level of sensory stimulation. In fact, there is evidence that the frequency of self-manipulatory behaviors is inversely related to the frequency of environmental manipulation (Guess 1960). Moreover, Piaget (1952) found that to the extent that the child persists in self-manipulatory habits, he tends not to develop those habits of manipulation of the environment that are critical in developing an understanding of the world.

Fraiberg's recent work on blind infants supports Piaget's idea. Most blind babies had "blind hands" during her initial observations. The hands did not serve as a primary sensory organ to seek and explore objects and to make sensitive discriminations. She suggests that blind hands in school age children result from an impasse in adaptive hand behavior during the sensorimotor period. "The stereotyped fingering, and the stereotyped posture at shoulder height speak for the failure of those hands to find meaning in experience. What we see in these hands are simple reflex movements, exercised in the near void of personal experience--empty, inutile, vestigial patterns." (Fraiberg 1977, p. 275-6).

Further, Fraiberg suggests that the gross motor rocking is left from earlier delayed mobility when the child had achieved postural readiness but had not yet achieved an incentive to move. If the mobility is delayed too long, the patterns become stereotyped and are "employed as an all-purpose, undifferentiated form of discharge." (Fraiberg 1977, p. 278)



BLIND CHILD EXPLORING LARGE OBJECT

3. Environmental Interactions

Many blind children do not seek active interactions with the environment either through gross motor activities or manipulation. Both of these issues relate directly to motor passivity and stereotypic behaviors discussed above.

There may be a further dimension, however. Without sight or clear vision, a child does not get the same amount of feedback from the environment about his actions. The knowledge that you can effectively produce changes in the environment is very basic in the development of self-concept and the comprehension of objects in the environment. (Jastrzembska, 1977, p. xii) The paucity of environmental response perceived by these children serves to further the developmental gap.

The perceived lack of response may be only partly a result of the handicapping condition. It may be the result of an impoverished environment which offers little feedback to any child. Therefore, before any conclusions can be drawn on the lack of environmental actions on the part of visually impaired children, a careful analysis of the environment must be made to assess its responsiveness.

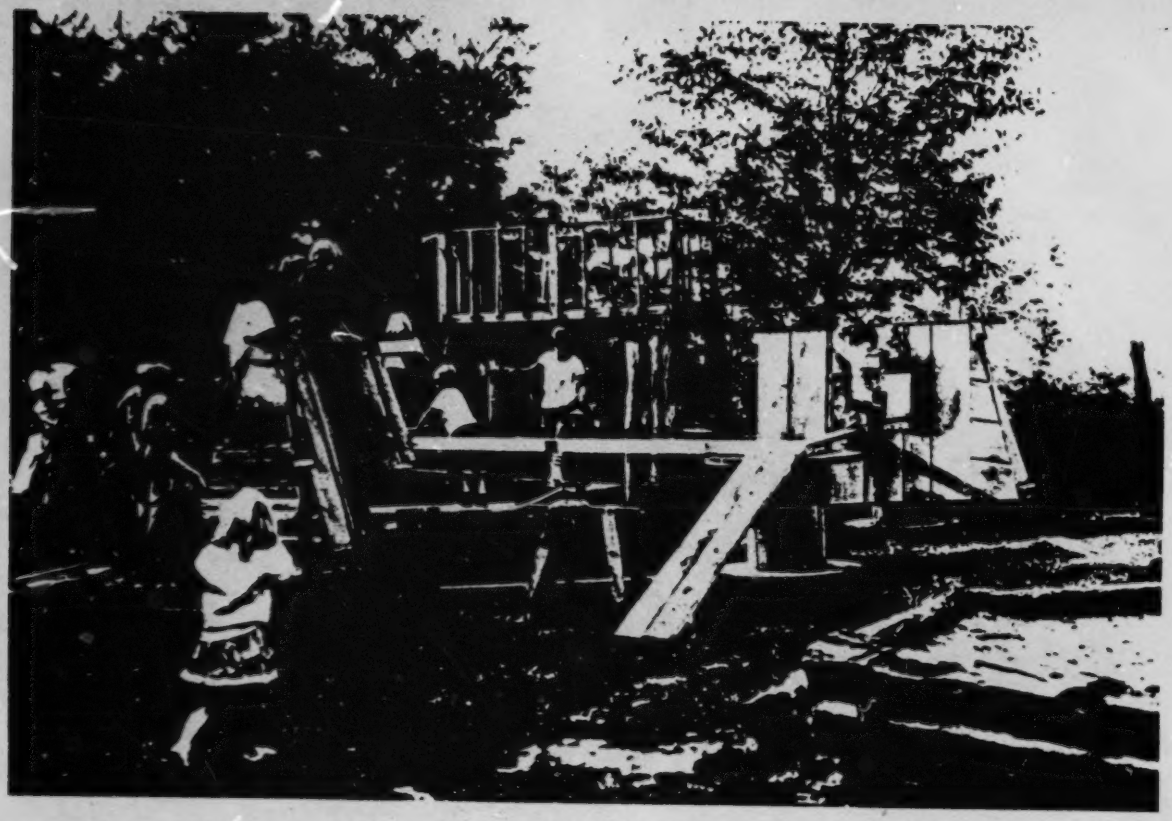
C. PLAY ENVIRONMENTS

Response to the needs and rights of handicapped children to have play and recreational experiences has taken the form of programs which encourage these children to participate in leisure activities and programs to train personnel in working with these children. Blind children have been given opportunities to participate in all kinds of sports activities--wrestling, skating, bowling, modified basketball, and modified ball games. Access to these activity programs is limited because the children are dependent on trained staff and scheduled times for participation.

An alternative approach for the provision of play and recreation opportunities lies in the area of providing physical environments designed for easy access and movement and which contain the objects, spaces, and situations for reinforcing positive interactions with the environment. The environment is especially valuable for exploration and play because it provides the context and props for play; it is continually available; it is nonevaluative; it provides constant feedback; and it allows a child to move at his own pace and to select, from among the myriad of opportunities that exist those experiences which are best suited to any given moment.

A play environment cannot in any way replace the need for social interaction and significant others. In fact, it is often necessary for those important people to provide and introduce the environment. However, an interesting, stimulating environment often eases the dependency of a child on adult attention and encourages self-initiated activities and independence. (Prescott 1973)

At present, the play environments that are available to most of our children, handicapped or otherwise, are woefully inadequate.



QUALITY ENVIRONMENTS FOR PLAY

> Nothing in our knowledge of child development indicates that we should continue to reproduce in ever increasing quantities static swings, slides, teetertotters, in asphalt deserts. They are maintenance free, good insurance risks, but also vandalism inspiring and utterly boring, on top of being completely alien to the development needs of the whole child. (Hill 1972, p. 11)

Ellis reports a Philadelphia study which noted that an average visit to a playground with traditional equipment was 15 minutes. Even during the most busy times, the usage of the play equipment was only 2-11% of the time the children were in attendance - approximately 1-1/2 minutes! (Ellis 1972, p. 137)

From the body of critics of current playgrounds and play equipment come suggestions for implementation of more interesting places for children. They state in some detail the characteristics of good children's playgrounds. (Lady Allen 1969, Bengtsson 1972, Bowers 1975, Dattner 1969, Ellis 1972, 1973, Friedberg 1972, Hogan 1974, Nicholson 1970, Schneekloth 1976)

Better playthings provide a degree of novelty for the child. They engage the child in exploratory activity, encouraging a physical manipulation of its properties. (Ellis 1972) The plaything must allow the child to make some impression on it, to change it in some way. (Lady Allen 1969)

The object must be sufficiently vague as to invite the child to create activities with it. "It follows that the more explicit an object is in the sense that it has no ambiguity, the more difficult it is to use it imaginatively in any other way." (Prangnell 1969, p. 39) Play equipment, such as swings, sliding boards, merry-go-rounds, which only allow one correct mode of interaction quickly become boring. Bower suggests that they are also inherently more dangerous (1975).

Current thinking on the subject suggests that all of the elements on a playground should provide a diverse and complex environment which allows the child freedom of choice to go where he wishes and to constantly make decisions about what to do. The physical structures should support this decision-making process by linkages

between artifacts. (Friedberg 1972)

Schneekloth devised a Play Object Complexity Scale (POCS) which measures the level of variables and complexity offered by a piece of equipment. In research conducted at the University of Wisconsin (Schneekloth and Blakeley 1976) the behavior of a group of preschool children was correlated to POCS rated equipment. The results indicate a clear preference for object complexity, regardless of age or sex of child.

"In any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it." (Nicholson 1970, p. 30)

Diversity, complexity, manipulability and freedom to choose a course of action--these are qualities proposed as elements of a good play environment.

IV. METHODS AND PROCEDURES

A. METHODOLOGICAL ISSUES AND LIMITATIONS

B. SUBJECTS

C. DATA VARIABLES

1. BEHAVIORS
   a. Gross Motor Behaviors
   b. Manipulative Behaviors
   c. Self-Stimulation Behaviors
   d. Social and Play Behaviors
2. ENVIRONMENT
   a. Location
   b. Environmental Components

D. METHODS

1. OBSERVATION
   a. Training
   b. Procedures
   c. Schedule
2. TESTING FOR MOTOR PROFICIENCY
   a. Data Variables
   b. Test Item Modification
   c. Training
   d. Procedures
   e. Schedule

E. ANALYSIS

1. BEHAVIORS
2. MOTOR PROFICIENCY
3. ENVIRONMENT

METHODS AND PROCEDURES

A. METHODOLOGICAL ISSUES AND LIMITATIONS

> "The laboratory situation gains precision at the expense of realism; the natural setting represents the reverse. We are often faced with a choice between results which are fuzzily meaningful or precisely meaningless." (Stea, 1974, p. 161)

The investigation of whether or not there are differences in the way visually impaired and sighted children play in an outdoor play environment necessitated naturalistic observation in an environment where the child played every day. It also required that the data be taken with as little interference as possible with the ongoing patterns of behaviors of the children. The method selected represents "a tender-minded, non-destructive technique for preserving intact naturally occurring behavior and its ecological environment." (Barker 1968, p. 260) We did complement the ecological method with a testing procedure to establish the motor proficiency level for each child. We wanted to ascertain how the natural, ongoing behaviors of the children related to their capabilities in the motor area. However, our primary method was naturalistic observation.

Urie Bronfenbrenner has criticized much of the child development research in this country as "the science of behavior of children in strange situations with strange adults." (Bronfenbrenner 1974, p. 3) The assumption that the behavior of children can be ascertained in an isolated two person system apart from other social contexts is ecologically invalid.

Ecological research has inherent strengths and weaknesses --the exchange of control for greater validity. This particular research has some limitations which fall into three distinct areas relating to environment, subjects and methodological techniques.

The environmental constraints were those of both location and climate. The subject groups were observed in similar but not identical environments. However, both environments provided children with opportunities for similar experiences, i.e., structures to get inside of and on top of, inclined planes or ramps, swings, slides and merry-go-rounds which provided movement through space. Because data were obtained while outside, it was not possible to control for fluctuations in weather conditions; temperatures did vary between 57°F and 80°F. Data were not collected on rainy days.

Only a small number of visually handicapped children were available for participation in the study which made random selection impossible. Neither was it possible to match subjects by sex and age between groups.

The subjects living conditions were not similar. The blind and partially sighted subjects reside in a residential facility while the sighted children were from family home environments. The subjects were observed after school in their respective school play environments. This procedure was routine for the blind and partially sighted children as a part of their after school schedule but was not typical for the sighted children. The sighted children were asked to stay after school instead of leaving immediately with parents.

The methodological constraints were those which are inherent in the procedures used. (a) The time sampling data procedures give a representative picture of behaviors over time but are limited because they do not provide information regarding duration of specific behaviors. (b) The presence of the observers in any research environment affects the ongoing pattern of behavior. The observers were noticed less by the blind children than by the partially sighted and sighted children. However frequent presence of adults around the children in both locations facilitated quick habituation to the observers' presences. (c) No motor tests are available for the visually handicapped child. Selected items of the Bruininks-Oseretsky Test of Motor Proficiency which were not sight dependent were selected. This test was chosen because (1) the test items represented both gross and fine motor activities, and (2) the test provided norms for children four and one-half years to fourteen and one-half years.

B. SUBJECTS

This study includes thirty-six sighted, partially sighted and blind children ranging in age from seven years seven months to thirteen years seven months. Twelve subjects were identified in each group. See Table 1 for age and sex of subjects.

For the purpose of this study, blind is defined as a complete loss of sight or minimal light perception. The term partially sighted refers to all other visual impairments beyond minimal light perception with visual acuity no better than 20/200 in the better eye with correction. The terms visually impaired and visually handicapped are used interchangeably to refer to the blind and partially sighted. The term sighted refers to vision better than 20/200 in both eyes with correction.

The children who were blind or partially sighted lived at and attended the Virginia School for the Deaf and Blind (VSDB) in Staunton, Virginia. Total school enrollment was forty-nine children for kindergarten through high school. All of the blind children and partially sighted children from VSDB between the ages of seven and thirteen were used for the study in order to have twelve per group.

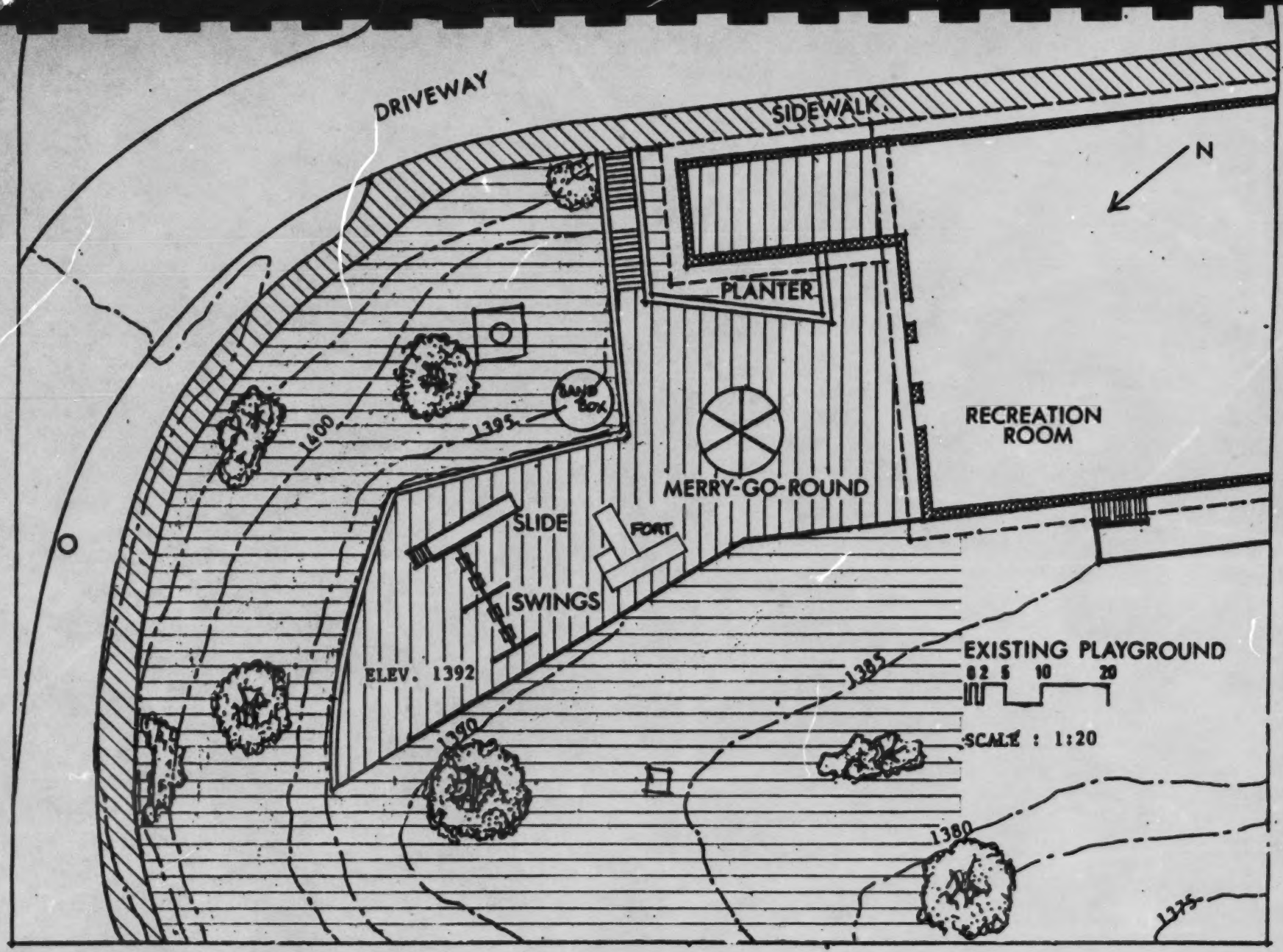
These children live in a three story dormitory building across the street from their educational building. The bottom floor consists of a recreational room which opens out onto a small playground. The playground may also be entered by stairs from the street level. (Figure 1)

The sighted children attended the Blacksburg New School, Blacksburg, Va. The school was selected because of its similarity to VSDB in being (1) a small school setting; (2) mixed age groups where children of various ages relate to each other on a daily basis. (Figure 2)

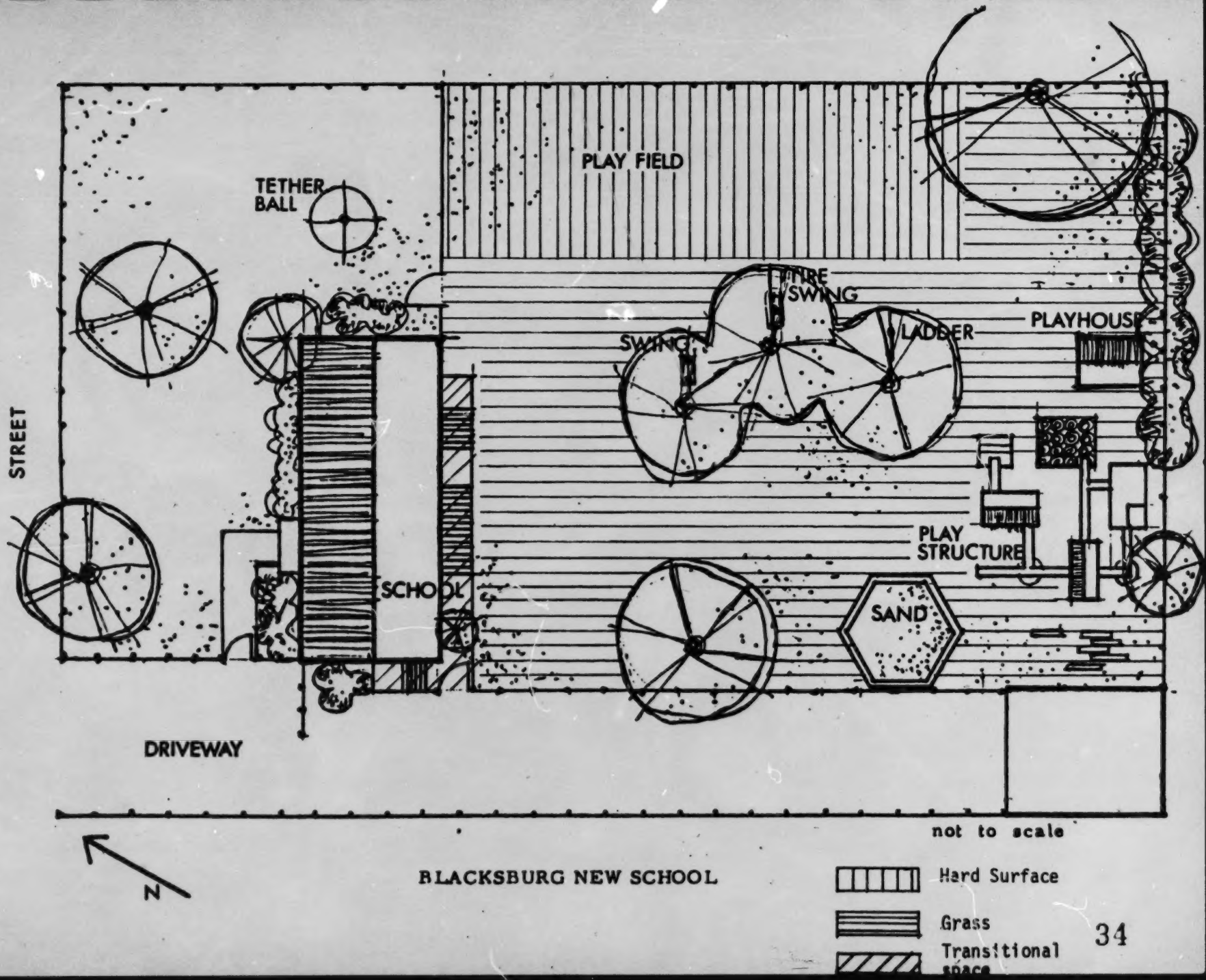
Table 1

SEX AND CHRONOLOGICAL AGE OF SUBJECTS

BLIND		PARTIALLY SIGHTED		SIGHTED	
Sex	Chronological age as of 9/1/79	Sex	Chronological age as of 9/1/79	Sex	Chronological age as of 9/1/79
M	8 yrs. 8 mos.	F	7 yrs. 7 mos.	M	8 yrs. 3 mos.
M	9 yrs. 1 mo.	F	7 yrs. 8 mos.	F	8 yrs. 4 mos.
F	9 yrs. 6 mos.	M	9 yrs. 9 mos.	M	8 yrs. 4 mos.
M	9 yrs. 8 mos.	M	10 yrs. 5 mos.	M	9 yrs. 1 mo.
M	10 yrs. 0 mos.	F	10 yrs. 8 mos.	M	9 yrs. 4 mos.
M	10 yrs. 1 mo.	M	11 yrs. 1 mo.	M	9 yrs. 6 mos.
F	10 yrs. 2 mos.	M	11 yrs. 7 mos.	M	9 yrs. 9 mos.
F	10 yrs. 3 mos.	F	11 yrs. 11 mos.	F	10 yrs. 1 mo.
M	10 yrs. 3 mos.	F	12 yrs. 2 mos.	M	10 yrs. 1 mo.
M	11 yrs. 5 mos.	M	12 yrs. 11 mos.	F	10 yrs. 3 mos.
F	11 yrs. 10 mos.	F	13 yrs. 3 mos.	F	10 yrs. 9 mos.
F	12 yrs. 6 mos.	F	13 yrs. 7 mos.	F	11 yrs. 2 mos.
N = 12, Females = 5, Males = 7, Mean Chronological Age = 10 yrs. 4 mos.		N = 12, Females = 7, Males = 5, Mean Chronological Age = 11 yrs. 4 mos.		N = 12, Females = 5, Males = 7, Mean Chronological Age = 9 yrs. 7 mos.	



VIRGINIA SCHOOL FOR THE DEAF AND BLIND


PLAY FIELD
TETHER BALL
TIRE SWING
SWING
LADDER
PLAYHOUSE
STREET
PLAY STRUCTURE
SCHOOL
SAND
DRIVEWAY
not to scale
N
BLACKSBURG NEW SCHOOL
Hard Surface
Grass
Transitional space

C. DATA VARIABLES

The purpose of this research was to explore the behaviors of children in their environment. Data were taken on both behaviors and environment.

A checklist was developed during a pilot project conducted in the Spring of 1979 and represented observed behaviors from all three subject groups so that the list was inclusive. The pilot testing of the checklist allowed for adjustments to be made in format so that ease of recording was possible. (see figure 3).

1. BEHAVIORS

The behaviors observed were gross motor, manipulative, self stimulation and social and play. For complete definition see Appendix C.

a. Gross Motor Behaviors - Those activities that employ the use of the large muscles of the body (e.g., climb, slide, sit, walk).

b. Manipulative Behaviors - The handling and exploring of objects using fine or gross motor movements (e.g., touch, put, throw, kick, at rest).

c. Self-Stimulation Behaviors - The use of fingers, particularly the thumb and forefinger, to manipulate part of one's body: scratching, rubbing, poking or otherwise handling the mouth, nose, ears, or hair. It may also be oriented to the other body parts. Self-stimulation also involves gross motor movements of the body such as body rock or chest beat.

*For data variables for testing section, see Testing for Motor Proficiency.

OBSERVATION CHECKLIST

CHILD_____ DATE_____ OBSERVATION #_____ TIME_____

SCHOOL_____ OBSERVERS_____ LOCATION_____

GROSS MOTOR ACTIVITY	X	Rel. Environment	
Environmental			
walk	20		97
run	21		98
loc on feet	22		99
jump	23		
			100
stand	24		101
sit	25		102
lie	26		103
squat/kneel/bend	27		104
lean	28		105
			106
climb	29		107
crawl	30		108
ride	31		109
hang	32		110
slide	33		111
fall	34		112
scuttle	35		113
other			114
Self			115
body rock/sway	36		116
jump	37		117
bounce	38		118
head shake	39		119
chest beat	40		120
handshake/clap	41		121
			122
Other	42		123
			124

MANIPULATIVE ACTIVITY	X	Environment	
Environmental			
finger/explore	43		125
touch	44		126
hold	45		127
grasps	46		128
put/drop	47		129
open/twist	48		
eat/drink	49		
kick	50		
throw	51		
strike/dig	52		
rock	53		
push/pull	54		
carry	55		
lift	56		
other			
reach out	57		
at rest	58		
Self			
face rub	59		130
eye poke/rub	60		131
mouth	61		132
touch (once)	62		133
finger/rub	63		134
hold	64		135
scratch	65		136
			137
	66		138
			139
Other	67		

SOCIAL AND PLAY BEHAVIORS	X	P	A	
Physical				
touch	68			140
hold	69			141
pat	70			142
give/take	71			143
				144
push/pull	72			145
hit	73			146
kick	74			147
grab/pinch	75			148
rough/tumble play	76			149
Vocalizations				150
sing	77			151
laugh	78			152
talk/listen	79			153
self-vocalization				154
Focus				155
listen/watch	80			156
long distance	81			157
				158
Cooperative Play				159
quiet	82			160
active	83			
Alone	84			
Other	85			
LOCATION				
Hard/Flat	90			
Sidewalk/Trans.	91			
Grass	92			
Stairs/Steps	93			
Equipment	94			
Room	95			
Transition Space	96			

Figure 3

d. Social and Play Behaviors - This may be contact with a peer or adult (e.g., touch, hug, hit, kick, talk, play).

2. ENVIRONMENT

Environment refers to the organization of space and the objects within it. See Appendix C for complete definitions. Both the location of the children on the playground and the environmental components with which s/he was interacting were recorded.

a. Location - Both environments contained the same kind of categories of location: Open Space (grass, hard surfaced); Transitional Space (sidewalks, stairs) and Equipment (play apparatus), (walls, railings, etc.).

b. Environmental Components - All of these components on the playground fall into one of the following categories: Equipment; Large Manipulables; Boundaries, Relationship to Equipment (in, at); Manipulable Objects; Self; and Others.

D. METHODS

Two methods were used in the research design. They were: (1) observations of each subject using time sampling, and (2) testing of motor proficiency for each subject.

1. OBSERVATIONS

The observation procedure used for behaviors was a time sampling technique. Time sampling is an efficient way to look at behavior patterns over a period of time. Although continuous monitoring of the behavior of each child during the entire unstructured free play period would be ideal, time, distance and financial constraints made it impossible.

a. Training of observers and recorders. The observers and recorders were familiarized with the two locations and subjects being observed. The observers were trained in the observation of the desired variables and time sampling techniques. During training, the two observers took data in the same setting and reliability checks were conducted. If inter-observer reliability fell below .90, retraining occurred.

The recorders familiarized themselves with the checklist and practiced taking data quickly. During training the recorders took the same data and accuracy checks were made.

b. Procedures. At Location 1 (VSDB) two observers and two recorders collected data on twenty-four children, twelve children per team. During each of the six observation sessions each observer recorded data on each child for five ten-second periods. At Location 2 (BNS) two observers and two recorders collected data on twelve children, six children per team. The procedure for collection of data was the same as that for the Virginia School for the Deaf and Blind. During each of the six sessions, each observer recorded data on each child for five ten-second periods.

Each observer used a tape recorder with a tape that sounded a tone ten-second intervals to inform the observer of continuation or termination of data. An earphone was used so that the tone would only be heard by the observer and would not distract the subjects being observed. The observer also carried a clipboard with a list of the subjects and checked off the ten-second periods as the behaviors were observed for each of the subjects. The observer watched the child for the ten-second period and dictated all of the behaviors and corresponding environmental components which were marked on the data sheets by the recorder. Each recorder carried a clipboard with an observation checklist. The recorder listed the subject's name and the number of the ten-second period being recorded and the location of the subject. As the observer dictated the behaviors, the recorder placed a check (√) in the appropriate place on the observation sheet and wrote out the name of the environmental component. (See appendix B-2 for sample completed checklist.)

This procedure allowed the observer to keep her eyes on the subject for the entire ten-second period.

The procedure resulted in thirty observations for each child or a total 1080 observations for all of the thirty-six children (Table 2).

Table 2

ORGANIZATION OF OBSERVATIONS

	Location 1 VSDB		Location 2 BNS
	12 Blind	12 Partial	12 Sighted
Sessions	6	6	6
Periods (10 sec. ea.)	5	5	5
Observations	30	30	30
Totals per group	360	360	360

Total for all 36 students = 1080 observations

Each observer and recorder located the first subject on their list. At the sound of the tone the observer quietly stated all of the behaviors and the environmental variables which occurred during the ten-second period. The recorder simultaneously recorded the data. The observer and recorder would then locate the next subject on the list and repeat the procedure, continuing through the list in sequence until each child had five ten-second periods recorded for each day. If the next child on the list was not present in the play area at his/her turn, data collectors continued through the list, returning to the missing subject when he/she appeared. The five ten-second intervals for each subject were separated by a minimum of five minutes.

Tests for interobserver reliability were conducted. The results of those tests showed the interobserver reliability to be .98. Twice during each session the observers took data

on the same child at each location. The first reliability check was taken when each observer had completed two ten-second observation periods for each of their subjects. The second reliability check was taken at the completion of data collection for that session. Training was repeated if inter-observer reliability checks were below .90.

c. Schedule. Data were collected at the two locations over a six week period. Each session was between an hour and an hour-and-a-half in length on alternating days at each location.

It was anticipated that there would be some interruption in the proposed schedule because of weather conditions and the possibility that children would be absent. For this reason two procedures for make-up of observations were developed and used. The first procedure was to schedule extra observation days. The original schedule called for all data to be collected during four weeks. Two additional weeks were scheduled for make-up of observation periods. The second procedure was to take one to four extra ten second observation periods on children during the regularly scheduled observation sessions when time permitted. For an overview of the sequence that was followed for data collection see Table 3. (See Appendix B-3 for the record of data and number of observations used/child.)

2. TESTING FOR MOTOR PROFICIENCY

The Bruininks-Oseretsky Test of Motor Proficiency was selected to assess motor proficiency level of the subjects because it contains measurement of both gross and fine motor skills and because it provides norms for children between four and one-half and fourteen and one-half years of age. The complete test consists of eight subtests and forty-six items. For purposes of this study five subtests and eleven items were chosen and administered because they were non-sight dependent. During consultation with Dr. Bruininks, he

Table 3

SCHEDULE OF DATA COLLECTION

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Week 1			BNS OB	VSDB OB 1		BNS MP
Week 2		BNS OB 2	VSDB OB 2	BNS OB 3	VSDB OB 3	VSDB MP
Week 3		VSDB OB 4	BNS OB 4	VSDB OB 5	BNS OB 5	VSDB MP
Week 4		VSDB OB 6		Bad Weather		
Week 5		BNS OB 6	Bad Weather	VSDB OB Make-up	BNS OB Make-up	
Week 6		VSDB OB Make-up			VSDB OB Make-up	

VSDB = Virginia School for the Deaf and Blind (blind and partially sighted subjects).
BNS = Blacksburg New School (sighted subjects).
OB = Observational data collected.
MP = Motor proficiency data collected.

suggested that in order to maintain reliability a minimum of five subtests out of the eight total must be used (Bruininks, Note 1).

a. Data variables.

Subtest 2: Balance

Item 3 - standing on preferred leg on balance beam.
Item 7 - walking forward heel-to-toe on balance beam.

Subtest 3: Bilateral Coordination

Item 1 - tapping feet alternately while making circles with fingers.
Item 6 - jumping up and clapping hands.

Subtest 4: Strength

Item 1 - broad jump.
Item 2 - sit-ups.
Item 3a - knee push-ups (for boys under age eight and all girls).
Item 3b - full push-ups (for boys age eight and older).

Subtest 5: Upper Limb Coordination

Item 7 - touching nose with index fingers - eyes closed.
Item 8 - touching thumb to fingertips - eyes closed.

Subtest 8: Upper Limb Speed and Dexterity

Item 1 - placing pennies in a box with preferred hand.
Item 2 - placing pennies in two boxes with both hands.

(Appendix D for details of specific test administration.)

b. Test item modifications. On Subtest 8: Upper Limb Speed and Dexterity items 1 and 2 were modified. The test modifications were used for all three subject groups. Item 1 calls for the subject to pick up pennies with the preferred hand from a

rubber mat and place them in a box. The mat, which was a light color, was substituted with a black rubber mat which was provided in the test kit. This change allowed for a contrast of color between the desk and the black mat. The contrast was critical for the partially sighted children. The yellow box which was provided to place the pennies in also was easily visible because of the black background. The test instructions called for the pennies to be picked up from the mat. To allow the blind children to easily and quickly find the pennies they were placed in a light tan box at the same location where the pennies were to be placed on the mat. The tan box used was from the Lincoln Oseretsky test kit.

Item 2 calls for the subject to place pennies in two boxes simultaneously with both hands. Again the black mat was used to provide a contrasting background to the yellow boxes. The pennies, as in Item 1, were placed in the tan boxes in the same location where they were to be laid out on the mat. The tan boxes used were from the Lincoln Oseretsky test kit.

On Subtest 2: Balance, Item 3 and Item 7, the procedures from the test manual were followed with one addition. Because of the special nature of the subject groups, care was taken to place the dark green balance beam against a light colored floor. This contrast of colors made it more easily visible for the partially sighted subjects. The same procedure was used for all of the subject groups.

c. Training of motor test administrators. The test administrators were familiarized with the two locations and the subjects to be tested. At both locations the test administrators practiced the test procedures on non-subject children until they were thoroughly familiar with the test items and their sequence.

d. Procedures for motor proficiency data collection. Two adults were present during the test administration, the test administrator and the subjects' physical education teacher. This is a modification of the Bruininks-Oseretsky test manual (1978). The physical educator

was present because the children knew her and would feel comfortable in her presence. This procedure was particularly important with the blind and visually impaired children but was also followed at BNS for purposes of control.

The testing environment was different from Location 1 and Location 2 but both environments were familiar to the subjects being tested. The environments were also free from noise and other distractions.

The subjects were brought into the test environment one at a time at half-hour intervals. The test administrator gave all of the verbal instructions accompanied by a demonstration appropriate for the specific test being administered. Verbal instructions were taken directly from the test manual for uniformity of presentation to all of the subject groups. Because of the nature of the children's handicap, sight dependent demonstrations were substituted by physically assisting the children through movements expected of them. The subject was encouraged with comments such as "You're doing nicely," or "That one was a little better or farther."

e. Schedule. The selected test items were administered at Location 1 and Location 2 on three different Saturdays in October from 8:30 a.m. until 2:00 p.m. Children were scheduled for testing at half-hour intervals. The test administration only required 20 to 25 minutes, which allowed a break between sessions for the test administrator. The children were tested according to their chronological age with the youngest children being tested first. The early part of the day was selected so that fatigue of the subjects would be minimized. See Table 3 for the schedule of data collection.

E. ANALYSIS

1. BEHAVIORS

The gross motor, manipulative, self-stimulation, social and play behaviors were analyzed from the collapsed records of the thirty possible observations per individual subject (see list of individual definitions of behaviors, Appendix C). The behaviors were analyzed according to the kind and frequency of behaviors. In addition, the gross motor behaviors were analyzed for diversity and complexity and the manipulative behaviors for diversity. Kind is the specific behavior - gross, manipulative, self-stimulation or social and play exhibited by the child. Frequency is the number of repetitions of a specific kind of gross, motor, manipulative, self-stimulation or social and play behavior. Diversity only required that a behavior occur once during the thirty observations for it to be included in the diversity measure. Complexity is the rating of the gross motor behaviors based upon its developmental sequence in the motor development of children. Each of the gross motor behaviors was assessed for its level of complexity and assigned a weighing reflecting the differences of complexity. This complexity number was then multiplied by the frequency of that behavior to arrive at a complexity score.

Univariate analysis of variance (ANOVA) was performed on the categories of behavior (gross, motor, manipulative, self-stimulation and social play) and subparts of these categories to determine if differences existed across groups. The level of statistical significance used for each analysis was .05. If the analysis of variance was statistically significant a post hoc multiple comparison procedure, Duncan's Multiple Range Test, was performed to determine which of the three groups were different. Subsequently, chi square analyses were performed on frequencies of individual behaviors within the gross motor, manipulative, self-stimulation, and social and play categories.

Two-way analyses of variance were also run to determine if there were differences based upon the age and sex of the subjects as well as to determine if there was an age by group or sex by group interaction. Since all of these analyses were non-significant only the results of one-way analyses of variance for group differences are reported in the results section.

2. MOTOR PROFICIENCY

The data from the motor proficiency testing for each subject group was correlated with the frequency and diversity of gross motor and manipulative behaviors and complexity of gross motor behaviors to determine whether relationships existed. The motor proficiency subtests were recorded as raw scores which had a corresponding point score. The scores were sent to Dr. R. H. Bruininks at the University of Minnesota, who translated the point scores into corresponding age equivalent scores in years and months. The information was obtained from age plot information which was developed as part of his early item analysis work in 1973.

The age equivalent information from each subtest was averaged to yield an average score for each subject group. A Pearson product moment correlation coefficient (r) was used to determine if there were relationships between diversity of behaviors and motor proficiency level and between frequency of behavior and motor proficiency level.

3. ENVIRONMENT

The environmental category* (location and environmental components) were analyzed from the collapsed records of the thirty possible observations per individual subject. The location and environmental components were analyzed by frequencies of the individual items within location and environmental components. Additionally, chi square analyses were performed to determine if differences existed among the groups.

Univariate analysis of variance (ANOVA) was performed on the environmental components and their subparts to determine if differences existed across groups. As with the behavior, the level of statistical significance used for each analysis was .05. If the analysis of variance was statistically significant, a post hoc multiple comparison procedure, Duncan's Multiple Range Test, was performed to determine which of the three groups were different.

*See List of definitions of environmental category and its subparts - Appendix C.

Two-way analysis of variance were also run to determine if there were differences based upon the age and sex of the subjects as well as to determine if there was an age by group or sex by group interaction.

V. RESULTS

A. MOTOR PROFICIENCY

1. Subtests
2. Analysis of Subtest Raw Scores and Age Equivalent Scores
3. Analysis of Total Raw Scores and Age Average Scores

B. BEHAVIORS

1. GROSS MOTOR BEHAVIORS
   a. Gross Motor - Kind and Frequency
   b. Gross Motor - Diversity
   c. Gross Motor - Frequency and Diversity by Motor Proficiency
   d. Gross Motor - Complexity
   e. Gross Motor - Complexity by Motor Proficiency
   f. Gross Motor - Active and Passive

2. MANIPULATIVE BEHAVIORS
   a. Manipulative - Kind and Frequency
   b. Manipulative - Diversity
   c. Manipulative - Frequency and Diversity by Motor Proficiency

3. SELF-STIMULATION BEHAVIORS
   a. Self-Stimulation - Gross Motor Behaviors
   b. Self-Stimulation - Fine Motor Behaviors
   c. Self-Stimulation - Contact with Others

4. SOCIAL AND PLAY BEHAVIORS
   a. Social and Play - Physical Contact
   b. Social and Play - Social Contact
   c. Social and Play - Contact with Others

C. ENVIRONMENT

1. LOCATION
   a. Location - Frequency
   b. Location - Frequency/Age and Sex

2. ENVIRONMENTAL COMPONENTS
   a. Components - Equipment Kind and Frequency/ Sight, Age and Sex
   b. Components - Boundaries Frequency/Sight, Age and Sex
   c. Components - Object Frequency/Sight, Age and Sex

A. MOTOR PROFICIENCY

NULL HYPOTHESIS: THERE IS NO DIFFERENCE IN PERFORMANCE OF SELECTED MOTOR TESTS EXHIBITED BY BLIND, PARTIALLY SIGHTED AND SIGHTED CHILDREN.

1. SUBTESTS

Those subtests from the Bruininks-Oseretsky Motor Proficiency Test used were:

Subtest 2: Balance
- Item 3 - standing on preferred leg on balance beam.
- Item 7 - walking forward heel-to-toe on balance beam.

Subtest 3: Bilateral Coordination
- Item 1 - tapping feet alternately while making circles with fingers.
- Item 6 - jumping up and clapping hands.

Subtest 4: Strength
- Item 1 - broad jump.
- Item 2 - sit-ups.
- Item 3a - knee push-ups (for boys under age eight and all girls).
- Item 3b - full push-ups (for boys age eight and older).

Subtest 5: Upper Limb Coordination
- Item 7 - touching nose with index fingers - eyes closed.
- Item 8 - touching thumb to fingertips - eyes closed.

Subtest 8: Upper Limb Speed and Dexterity
- Item 1 - placing pennies in a box with preferred hand.
- Item 2 - placing pennies in two boxes with both hands.

(See Appendix D for details of specific test administration.)

2. ANALYSIS OF SUBTEST RAW SCORES AND AGE EQUIVALENT SCORES

The analysis of variance (ANOVA) was conducted on the motor proficiency raw scores and age equivalent scores for each subtest to determine if there were differences among groups at the .05 level (see Table 4). These data indicated that there were statistically significant differences among the groups in the raw scores and age equivalent scores for each of the subtests.

To determine which groups were significantly different, a post hoc multiple comparisons procedure, Duncan's Multiple Range Test, was conducted on the motor proficiency age equivalent scores. The results of these analyses indicated that the blind and partially sighted subjects were different from the sighted subjects but were not different from each other on the following age average scores for subtests: Subtest 2, Balance; Subtest 3, Bilateral Coordination; Subtest 4, Strength, and Subtest 8, Upper Limb Speed and Dexterity. On Subtest 5, Upper Limb Coordination, the results of the multiple comparisons procedure indicated that there was no difference between the blind and partially sighted subjects; however, there was a statistically significant difference between the blind and the sighted groups.

The multiple comparisons procedure was also conducted on the motor proficiency raw scores. For the raw score Subtest 2, Balance; Subtest 3, Bilateral Coordination; and Subtest 8, Upper Limb Speed and Dexterity results showed the blind and partially sighted subjects were different from the sighted but were not different from each other. On the raw score for Subtest 4, Strength, all three subject groups were different from the other. On the raw score for Subtest 5, Upper Limb Coordination, there was no difference between the blind and partially sighted subjects, however, there was a statistically significant difference between the blind and the sighted groups.

3. ANALYSIS OF TOTAL RAW SCORE AND AGE AVERAGE SCORES

The ANOVA was conducted on the total age average score to determine if differences existed among groups. The results for the total age average score indicated that there were significant differences among groups at the .05 level ($F = 14.136$, $p = 0.0001$; see Table 5).

Table 4

MOTOR PROFICIENCY RAW SCORES AND AGE EQUIVALENT SCORES FOR EACH SUBTEST

		Blind	Partial	Sighted	F	p
Subtest 2: Balance						
Raw Score 2	$\bar{X}$	2.0000	2.0833	6.0833	11.094	0.0001
	SD	2.2962	1.6214	2.9064		
Age Equivalent Score 2	$\bar{X}$	4.9217	5.0087	8.2767	12.120	0.0001
	SD	1.8700	1.3445	2.3576		
Subtest 3: Bilateral Coordination						
Raw Score 2	$\bar{X}$	2.2500	2.3333	4.0000	4.654	0.0166
	SD	1.8153	1.4975	1.4143		
Age Equivalent Score 3	$\bar{X}$	5.9483	6.0725	8.8967	3.956	0.0288
	SD	3.2201	2.5784	2.8791		
Subtest 4: Strength						
Raw Score 4	$\bar{X}$	7.8333	13.4167	21.5833	14.117	0.0001
	SD	6.5343	7.6332	4.5817		
Age Equivalent Score 4	$\bar{X}$	5.6267	7.4492	10.7050	14.966	0.0001
	SD	1.7368	2.5060	2.5738		
Subtest 5: Upper Limb Coordination						
Raw Score 5	$\bar{X}$	1.10000	1.4167	2.0000	5.906	0.0064
	SD	0.9535	0.7930	0.0		
Age Equivalent Score 5	$\bar{X}$	4.3175	4.975	5.5450	5.821	0.0068
	SD	1.1744	0.9771	0.0		
Subtest 8: Upper Limb Speed and Dexterity						
Raw Score 8	$\bar{X}$	3.8333	5.0833	10.2500	16.088	0.0001
	SD	3.5633	2.8110	2.3012		
Age Equivalent Score 8	$\bar{X}$	4.7825	5.2662	8.9317	21.074	0.0001
	SD	1.6823	1.6100	1.8360		

Table 5

MOTOR PROFICIENCY

Total Average Age for Subtests

	$\bar{X}$	SD
Blind	5.119332	1.693681
Partial	5.754666	1.586031
Sighted	8.470999	1.639224

To determine which groups were significantly different a post hoc multiple comparisons procedure was conducted on the total average age motor proficiency subtests. The results showed that the blind and partially sighted subjects were different from the sighted subjects, but were not different from each other.

The ANOVA was conducted on the total motor proficiency raw score to determine if differences existed among groups. The results for the total raw score indicated that there were significant differences at the .05 level ($F = 15.939$, $p = 0001$; see Table 6).

Table 6

MOTOR PROFICIENCY

Total Raw Score for Subtests

	$\bar{X}$	SD
Blind	16.9167	13.5610
Partial	24.3333	12.6802
Sighted	43.9167	9.7371

The results of the post hoc multiple comparisons procedure indicated that the blind and partially sighted subjects were different from the sighted, but were not different from each other.

Based upon the results of the above analyses, the null hypothesis, there is no difference in performance of selected motor tests exhibited by blind, partially sighted and sighted children, was rejected.

B. BEHAVIORS

1. GROSS MOTOR BEHAVIORS

NULL HYPOTHESIS: THERE IS NO DIFFERENCE IN GROSS MOTOR BEHAVIORS EXHIBITED BY BLIND, PARTIALLY SIGHTED AND SIGHTED CHILDREN DURING UNSTRUCTURED PLAY FOR THE FOLLOWING:

a. KIND AND FREQUENCY
b. DIVERSITY
c. FREQUENCY AND DIVERSITY BY MOTOR PROFICIENCY
d. COMPLEXITY
e. COMPLEXITY BY MOTOR PROFICIENCY
f. ACTIVE AND PASSIVE

a. GROSS MOTOR - KIND AND FREQUENCY

The initial analysis on gross motor behaviors was done on frequency and kind. The null hypothesis was: There is no difference in the kind and frequency of gross motor behaviors exhibited by blind, partially sighted, and sighted children during unstructured play.

The gross motor category consisted of the following behaviors: walk, stand, squat, run, jump, climb, hang, ride, sit, lean, lie, scuttle and locomotor other. The following gross motor behaviors were dropped because frequencies were five or fewer than five for two out of the three subject groups: slide, fall, crawl, and gross motor other.

ANOVA was used to test the differences among the groups for the kind and frequency of gross motor behaviors exhibited. The results indicated that there was a significant difference among the groups at the .05 level ($F = 7.557$, $p = 0.0020$; see Table 7). The results of the post hoc multiple comparisons procedure indicated that the blind and partially sighted subjects were different from the sighted subjects, but were not different from each other.

Table 7

GROSS MOTOR BEHAVIORS

	$\bar{X}$	SD
Blind	48.5833	4.8889
Partial	52.2500	4.9013
Sighted	57.7500	7.3128

In order to further explore the differences among the groups on the specific gross motor behaviors, chi square analyses were conducted on frequencies for each gross motor behavior. Table 8 contains the gross motor behaviors for which there was a significant chi square indicating a difference in the frequency for the groups. These results are illustrated in Figure 4. The three subject groups did not differ significantly at the .05 level for the following gross motor behaviors: lean, lie, scuttle and locomotor other. Therefore, based upon these analyses, the null hypothesis, there is no difference in the kind and frequency of gross motor behaviors of blind, partially sighted and sighted children during unstructured play, was rejected

b. GROSS MOTOR - DIVERSITY

The second area considered was diversity of gross motor behaviors. The null hypothesis was: There is no difference in the diversity of gross motor behaviors exhibited by blind, partially sighted and sighted children exhibited during unstructured free play.

The ANOVA of the diversity of gross motor behaviors among groups was significant at the .05 level ($F = 10.601$, $p = 0.0003$; see Table 9). The results of the post hoc multiple comparisons procedure indicated that the blind and partially sighted subjects were different from the sighted subjects, but were not different from each other. Therefore, the null hypothesis, there is no difference in the diversity of gross motor behaviors for the blind, partially sighted and sighted children during unstructured play, was rejected.

Table 8

GROSS MOTOR BEHAVIORS

Frequency and Percent of Behaviors with Significant Chi Squares

Gross Motor Behaviors	Subjects			x^2	p
	Blind	Partial	Sighted		
Walk	75 (19.9%)	116 (31.7%)	124 (33.2%)	19.37987	0.0001
Stand	114 (30.3%)	172 (47.0%)	199 (53.2%)	42.74908	0.0001
Squat	18 (4.8%)	25 (6.8%)	56 (15.0%)	26.86928	0.0001
Run	10 (2.7%)	27 (7.4%)	47 (12.6%)	26.45844	0.0001
Jump	8 (2.1%)	10 (2.7%)	23 (6.1%)	9.93547	0.0070
Climb	7 (1.9%)	6 (1.6%)	31 (8.3%)	28.07953	0.0001
Hang	1 (0.3%)	12 (3.3%)	23 (6.1%)	20.79764	0.0001
Sit	202 (53.7%)	132 (36.1%)	99 (26.5%)	60.36024	0.0001
Ride	93 (24.7%)	65 (17.8%)	18 (4.8%)	57.63852	0.0001

Table 9

GROSS MOTOR BEHAVIORS - DIVERSITY

	$\bar{X}$	SD
Blind	8.2500	2.0057
Partial	9.2500	1.9598
Sighted	11.5000	1.2532

c. GROSS MOTOR - FREQUENCY AND DIVERSITY BY MOTOR PROFICIENCY

The frequency and diversity of gross motor behaviors were correlated to motor proficiency. The null hypothesis was: There is no relationship between frequency of gross motor behaviors and the motor proficiency level; there is no relationship between the diversity of gross motor behaviors and motor proficiency level for blind, partially sighted and sighted children.

In order to determine the relationship between diversity of gross motor behaviors and motor proficiency level, and frequency of gross motor behaviors and motor proficiency level, the age average score from all subtests was correlated with the frequency and diversity of gross motor behaviors for all three subject groups combined (N = 36) and for individual groups (N = 12). The correlation of the frequency of gross motor behaviors with motor proficiency level for all three subject groups combined (N = 36) was significant at the .05 level ($r = 0.4796$, $p = 0.0031$). In addition, the correlation of diversity of gross motor behaviors with motor proficiency level for all three subject groups (N = 36) was significant at the .05 level ($r = 0.2813$, $p = 0.0044$).

The correlation of frequency of gross motor behaviors with motor proficiency level and diversity of gross motor behaviors with motor proficiency level was computed for the individual subject groups (N = 12). The results of these analyses indicated that the correlation coefficients were not significant at the .05 level.

The age equivalent scores for Subtest 2, Balance and Subtest 4, Strength, were correlated with the diversity and frequency of gross motor behaviors using all three subject groups combined (N = 36). These correlation coefficients were statistically significant at the .05 level (see Table 10). Therefore, the null hypothesis, there is no relationship between diversity of gross motor behaviors and the motor proficiency level and frequency of manipulative behaviors and motor proficiency level for the blind, partially sighted and sighted children during unstructured play, was rejected.

Table 10

GROSS MOTOR BEHAVIORS

Diversity and Frequency Correlated to Motor Proficiency Subtest 2 and Subtest 4 Using N = 36.

	Diversity of Gross Motor	Frequency of Gross Motor
Subtest 2 Balance	r = 0.5012 (p = 0.001)	r = 0.4047 (p = 0.0007)
Subtest 4 Strength	r = 0.5311 (p = 0.0001)	r = 0.4083 (p = 0.0007)

d. GROSS MOTOR - COMPLEXITY

The complexity of gross motor behaviors were examined for differences among groups. The null hypothesis was: There is no difference in the complexity of gross motor behaviors exhibited by the blind, partially sighted and sighted children during unstructured play.

The gross motor behaviors were grouped according to their developmental complexity. These groups consisted of three levels. Level 1 behaviors were: stand, lean, sit, lie; Level 2, ride, slide, walk, scuttle, squat; Level 3, jump, run, loc, climb, crawl, hang.

The ANOVA for the complexity of the gross motor behaviors among groups was significant at the .05 level (F = 10.359, p = 0.0030; see Table 11). The results of the post hoc

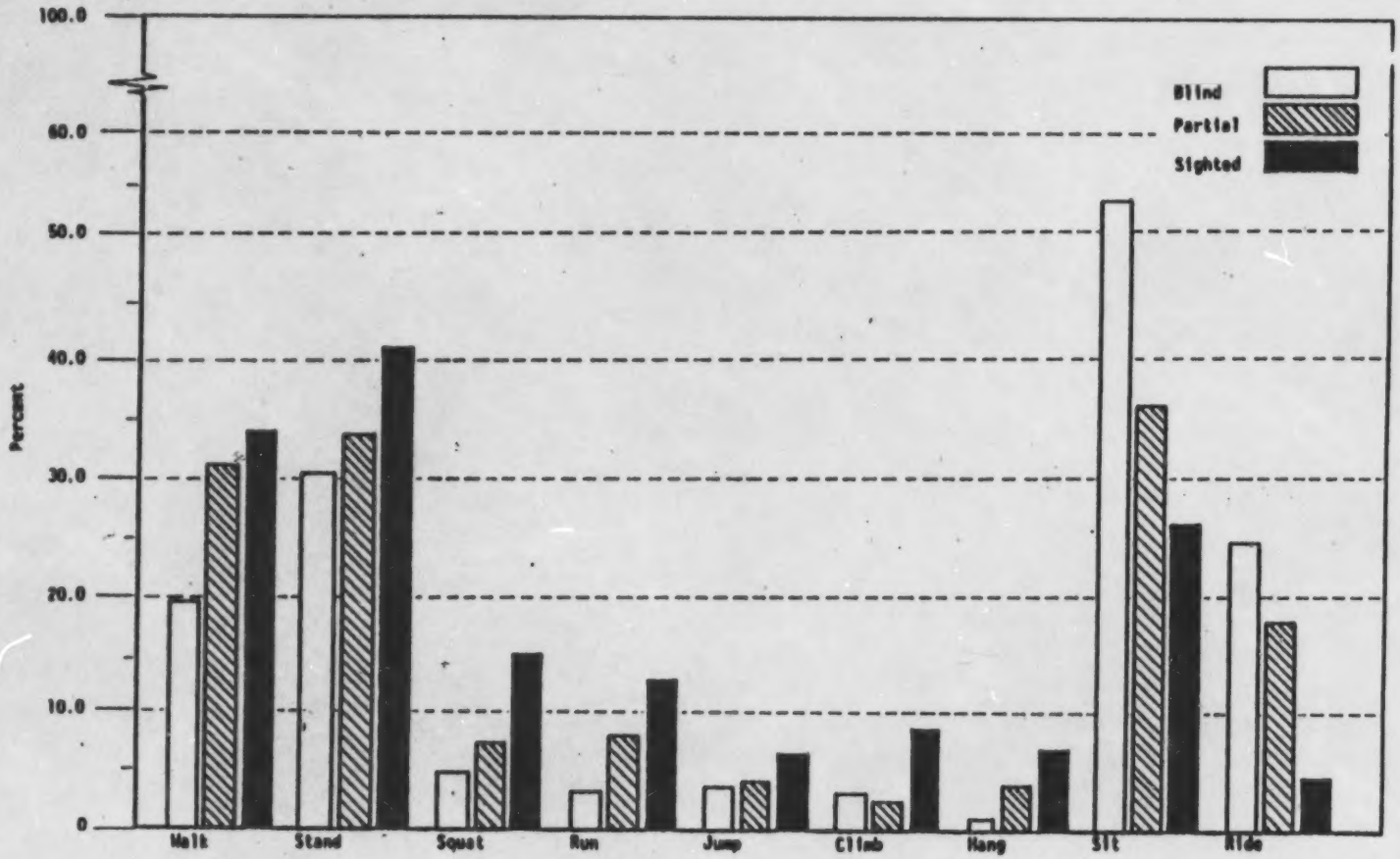


Figure 4 GROSS MOTOR BEHAVIORS
Significant chi squares

Figure 4

multiple comparisons procedure indicated that the blind and partially sighted subjects were different from the sighted subjects, but were not different from each other.

Table 11

GROSS MOTOR BEHAVIOR - COMPLEXITY

	$\bar{X}$	SD
Blind	2.5182	0.5156
Partial	2.8466	0.5881
Sighted	3.4519	0.4098

Therefore, based upon these analyses, the null hypothesis, there is no difference in the complexity of gross motor behavior of the blind, partially sighted and sighted during unstructured play, was rejected.

e. GROSS MOTOR - COMPLEXITY BY MOTOR PROFICIENCY

The complexity of gross motor behaviors was correlated to motor proficiency. The null hypothesis was: there is no relationship between complexity of gross motor behaviors for blind, partially sighted and sighted children during unstructured play.

To determine the relationship between complexity of gross motor behaviors and motor proficiency level, the age average score from all subtests was correlated with the complexity score of gross motor behaviors for all three subject groups combined (N = 36) and for individual groups (N = 12). The correlation of the complexity of gross motor behaviors with motor proficiency for all three subject groups combined (N = 36) was significant at the .05 level ($r = 0.5620$, $p = 0.0004$).

The correlation of complexity of gross motor behaviors with motor proficiency for the individual subject groups (N = 12) was only significant at the .05 level ($r = 0.6799$, $p = 0.0151$) for the partially sighted subject group. Therefore, based on the above analyses, the

null hypothesis, there is no relationship between complexity of gross motor behaviors and the motor proficiency level for the blind, partially sighted, and sighted during unstructured play, was rejected.

f. GROSS MOTOR - ACTIVE AND PASSIVE

In addition to the above analyses of the gross motor behaviors considered collectively, the behaviors were divided into two subgroups: (1) active gross motor behaviors or those behaviors that involve locomotion: walk, run, jump, climb, hang, scuttle and crawl, and (2) passive gross motor behaviors or those that are stationary: stand, sit, lie, lean, and squat. This division of gross motor activities was done to determine whether there was a difference in active and passive gross motor behaviors among groups.

The ANOVA was used to determine whether there was a significant difference in active gross motor behaviors among the groups at the .05 level. The results showed a significant difference among groups at $F = 20.521$, $p = 0.0001$ (see Table 12). The results of the post hoc multiple comparisons procedure showed all three subject groups to be different from each other.

Table 12

GROSS MOTOR BEHAVIORS - ACTIVE

	$\bar{X}$	SD
Blind	9.3333	3.7497
Partial	14.8333	6.1767
Sighted	22.0000	4.3484

The ANOVA was used to determine if differences existed among groups on the passive gross motor behaviors. The results indicated that there was a significant difference among groups at the .05 level ($F = 8.527$, $p = 0.0010$;

see Table 13). The results of the multiple comparisons procedure indicated that the blind and partially sighted subjects were different from the sighted subjects, but did not differ from each other.

Table 13

GROSS MOTOR BEHAVIORS - PASSIVE

	$\bar{X}$	SD
Blind	22.5833	6.2298
Partial	25.4167	5.9918
Sighted	32.0833	5.0715

2. MANIPULATIVE BEHAVIORS

NULL HYPOTHESIS: THERE IS NO DIFFERENCE IN MANIPULATIVE BEHAVIORS EXHIBITED BY BLIND, PARTIALLY SIGHTED AND SIGHTED CHILDREN DURING UNSTRUCTURED PLAY FOR THE FOLLOWING:

a. KIND AND FREQUENCY
b. DIVERSITY
c. FREQUENCY AND DIVERSITY BY MOTOR PROFICIENCY

a. MANIPULATIVE - KIND AND FREQUENCY

The initial analyses on the manipulative behaviors was done on kind and frequency. The null hypothesis was: There is no difference in the kind and frequency of manipulative behaviors exhibited by blind, partially sighted and sighted children during unstructured play.

The manipulative category consisted of two subgroups of behaviors. They were:

(1) Fine motor manipulative behaviors: finger/explore, touch, hold, grasp, put/drop, eat/drink, and

(2) Gross motor manipulative: throw, strike/dig, push/pull and gross motor manipulative other.

The following manipulative behaviors were dropped because frequencies were five or fewer for two out of the three subject groups: rock, kick, carry, lift, open/twist, fine motor manipulative other.

The ANCVA was used to test the differences among the groups for the kind and frequency of the total manipulative behaviors exhibited. (See Table 14) The results indicated that there was no significant differences among groups. In addition, the manipulative fine and gross motor behaviors were submitted to an analysis of variance to determine whether differences existed among groups. The results indicated that there were no significant differences at the .05 level for fine manipulative behaviors and gross manipulative behaviors.

Table 14

MANIPULATIVE CATEGORY AND SUBGROUPS OF BEHAVIORS

	Total Manipulative		Manipulative Fine		Manipulative Gross	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Blind	48.6667	10.4301	40.9167	8.4365	7.7500	4.3301
Partial	48.5000	8.0960	39.6667	7.3773	8.8333	3.1675
Sighted	43.333	7.6078	36.1667	4.8021	7.1667	4.6677

Since this study was concerned not only with categories of behaviors but individual items within each category, chi square analyses were conducted on frequencies of individual behaviors. This was done despite the non-significant results of the ANOVA for the manipulative category.

Table 15 contains the manipulative behaviors for which there was a significant chi square indicating a difference among the frequencies for the groups. These results are illustrated in Figure 5. The three subject groups did not differ significantly at the .05 level for the following manipulative behaviors: touch, grasp, strike/dig. Therefore, based on these analyses, the null hypothesis, there is no difference in the kind and frequency of manipulative behavior exhibited by blind, partially sighted and sighted children during unstructured play, was retained.

Table 15

MANIPULATIVE BEHAVIORS

Frequency and Percentage of Observed Behaviors with Significant Chi Squares

Manipulative Behavior	Subjects			X^2	p
	Blind	Partial	Sighted		
Hold	131 (34.8%)	145 (39.6%)	102 (27.3%)	12.82332	0.0016
Put	9 (2.4%)	22 (6.0%)	16 (4.3%)	6.02193	0.0492
Finger/ explore	87 (23.1%)	58 (15.8%)	63 (16.8%)	7.69475	0.0213
Eat/ drink	27 (7.2%)	53 (14.5%)	17 (4.5%)	24.63892	0.0001
Throw	6 (1.6%)	18 (4.9%)	9 (2.4%)	7.72809	0.0210
Push/ pull	67 (17.8%)	72 (19.7%)	37 (9.9%)	15.10838	0.0005
Manip. Other: Bounce	2 (0.5%)	31 (8.5%)	8 (2.1%)	37.76802	0.0001

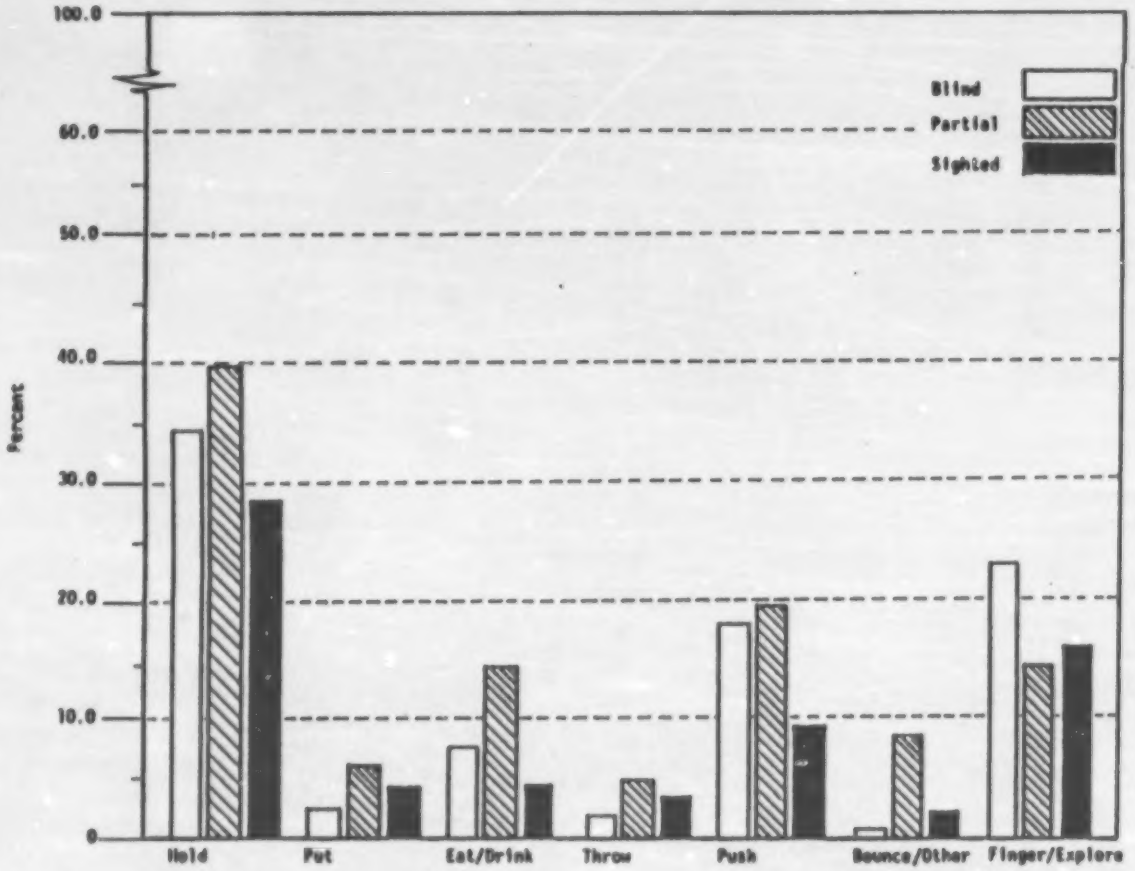


Figure 5 MANIPULATIVE BEHAVIORS
Significant chi squares

Figure 5

b. MANIPULATIVE - DIVERSITY

The null hypothesis was: There is no difference in the diversity of manipulative behavior exhibited by blind, partially sighted and sighted children during unstructured play.

The ANOVA of the diversity of manipulative behaviors among groups was not significant (see Table 16). Therefore based on these analyses, the null hypothesis, there is no difference in the diversity of manipulative behaviors exhibited by blind, partially sighted and sighted children was retained.

Table 16

MANIPULATIVE BEHAVIORS - DIVERSITY

	$\bar{X}$	SD
Blind	7.6667	1.3707
Partial	8.2500	1.3568
Sighted	8.667	1.6967

c. MANIPULATIVE - FREQUENCY AND DIVERSITY BY MOTOR PROFICIENCY

The frequency and diversity of manipulative behaviors was correlated to the motor proficiency level. The null hypothesis was: There is no relationship between the diversity of manipulative behaviors and the motor proficiency level for blind, partially sighted and sighted children during unstructured play.

In order to determine the relationship between diversity of manipulative behaviors and motor proficiency level, the age average score from all subtests was correlated with the frequency and diversity of manipulative behaviors for all three subject groups combined (N = 36) and for each individual subject group (N = 12). The correlation of the frequency of manipulative behavior with motor proficiency level and diversity of manipula-

tive behavior with motor proficiency level for all three subject groups combined (N = 36) was not significant at the .05 level.

The correlation of frequency of manipulative behaviors with motor proficiency level and the diversity of manipulative behaviors to motor proficiency level was computed for the individual subject groups (N = 12). The results of these analyses indicated that the correlation coefficients were significant for the frequency of manipulative behaviors and motor proficiency level for the blind subjects (N = 12) at the .05 level ($r = 0.6054$, $p = 0.0370$). None of the other subject groups had a significant correlation coefficient between frequency and diversity of manipulative behaviors and motor proficiency level.

The age equivalent scores for Subtest 2, Balance, and Subtest 4, Strength, were correlated with the diversity and frequency of the total manipulative category and manipulative gross behaviors using all three subject groups combined (N = 36) and each subject group (N = 12). The correlation coefficients were not significant at the .05 level for the frequency and diversity of manipulative behaviors and motor proficiency level using the combined subject groups (N = 36). The correlation coefficients were significant at the .05 level for the blind and partially sighted subject groups for the frequency of manipulative category and manipulative gross behaviors correlated with the age equivalent score for Subtest 4, Strength (see Table 17). There were no significant correlation coefficients for diversity and Subtest 4, Strength, using the individual subject groups.

Table 17

TOTAL MANIPULATIVE CATEGORY AND MANIPULATIVE GROSS BEHAVIORS

Frequency Correlated to Subtest 4, Strength

	Manipulative Category	Manipulative Gross
Blind	$r = 0.5665$ ($p = 0.027$)	$r = 0.5303$ ($p = 0.038$)
Partial	———	$r = 0.427$ ($p = 0.060$)

The age equivalent score for Subtest 8, Upper Limb Speed and Dexterity, was correlated to diversity and frequency of the manipulative category and manipulative fine behaviors using both the three subject groups combined (N = 36) and the individual subject groups (N = 12). The only significant correlation coefficient found was for the blind subject group (N = 12) when frequency was correlated with the manipulative category and motor proficiency (see Table 18). Even though there were two significant correlation coefficients, the null hypothesis, there is no relationship between diversity of manipulative behaviors and the motor proficiency level and frequency of manipulative behaviors and motor proficiency level, was retained.

Table 18

MANIPULATIVE CATEGORY AND MANIPULATIVE FINE BEHAVIORS

Frequency Correlated to Subtest 8
Upper Limb Speed and Dexterity

	Manipulative Category	Manipulative Fine
Blind	r = 0.6307 (p = 0.014)	r = 0.5353 (p = 0.036)

3. SELF-STIMULATION BEHAVIORS

NULL HYPOTHESIS: THERE IS NO DIFFERENCE IN FREQUENCY AND KIND OF SELF-STIMULATION BEHAVIORS EXHIBITED BY BLIND, PARTIALLY SIGHTED AND SIGHTED CHILDREN DURING UNSTRUCTURED PLAY FOR THE FOLLOWING:

a. SELF-STIMULATION GROSS MOTOR BEHAVIORS
b. SELF-STIMULATION FINE MOTOR BEHAVIORS
c. SELF-STIMULATION CONTACT WITH SELF

a. SELF-STIMULATION - GROSS MOTOR BEHAVIORS

Self-stimulation behaviors were analyzed according to kind and frequency. The null hypothesis was: There is no difference in the kind and frequency of gross motor self-stimulation behaviors for the blind, partially sighted, and sighted during unstructured play.

The self-stimulation category consisted of two subgroups of behaviors. They were: (1) Gross motor self-stimulation behaviors: body rock/sway, jump, bounce, head shake, chest beat, handshake/clap, other; (2) Fine motor self-stimulation behaviors: face rub, eye poke/rub, mouth, touch self (once), finger/rub, hold self, scratch, other.

The following self-stimulation behaviors were dropped because frequencies were five or fewer for two out of the three subject group: jump, head shake, chest beat, bounce, face rub, gross motor self-stimulation other and fine motor self-stimulation other.

ANOVA was used to test the differences among the groups for the kind and frequency of gross motor self-stimulation behaviors. The results indicated that there was a significant difference among the groups at the .05 level ($F = 9.812$, $p = 0.0005$; see Table 19 & Figure 6) The results of the post hoc multiple comparisons procedure indicated that the partially sighted and sighted subjects were different from the blind subjects but were not different from each other.

Table 19

SELF-STIMULATION

Gross Motor Behaviors

	$\bar{X}$	SD
Blind	5.7500	5.2017
Partial	1.0833	1.6214
Sighted	0.5000	0.7977

In order to further explore the differences among the groups for the specific gross motor self stimulation behaviors, chi square analyses were conducted on frequencies for each gross motor self stimulation behavior. Table 20 contains the gross motor self stimulation behaviors for which there was a significant chi square indicating a difference in the frequency for the groups.

Table 20

SELF-STIMULATION

Frequency & Percent of Observed Gross Motor Self Stimulation Behaviors with Significant Chi Squares

Gross Motor Self-Stimulation	Subjects			X^2	p
	Blind	Partial	Sighted		
Body Rock/Sway	32 (8.5%)	9 (2.5%)	0 (0.0%)	40.51582	0.0001
Clap	15 (4.9%)	3 (0.8%)	1 (0.3%)	17.99548	0.0001

Therefore, based on the above analyses the null hypothesis, there is no difference in the kind and frequency of gross motor self-stimulation behaviors by the blind, partially sighted and sighted during unstructured play, was rejected.

b. SELF-STIMULATION - FINE MOTOR BEHAVIOR

In addition to the analysis of kind and frequency of gross motor self-stimulate behaviors, the fine motor self-stimulation behaviors were analyzed. The null hypothesis was: There is no difference in the kind and frequency of fine motor self-stimulation behaviors for the blind, partially sighted, and sighted children during unstructured play.

ANOVA was used to test the differences among the groups for the kind and frequency of the fine motor self stimulation behaviors. The results indicated that there was a significant difference among the groups at the .05 level ($F = 6.168$, $p = 0.0053$; see Table 21 and Figure 6) The results of the post hoc multiple comparisons procedure indicated that the sighted subjects were significantly higher than the partially sighted subjects.

Table 21

SELF-STIMULATION - FINE MOTOR BEHAVIOR

	$\bar{X}$	SD
Blind	11.5833	5.0894
Partial	8.0000	4.5726
Sighted	14.4167	3.6794

In order to further explore the differences among groups or the specific fine motor self stimulation behaviors, chi square analyses were conducted on frequencies for each fine motor self-stimulation behavior. Table 22 contains the fine motor self stimulation behaviors for which there was a significant chi square indicating a difference in the frequency for the groups.

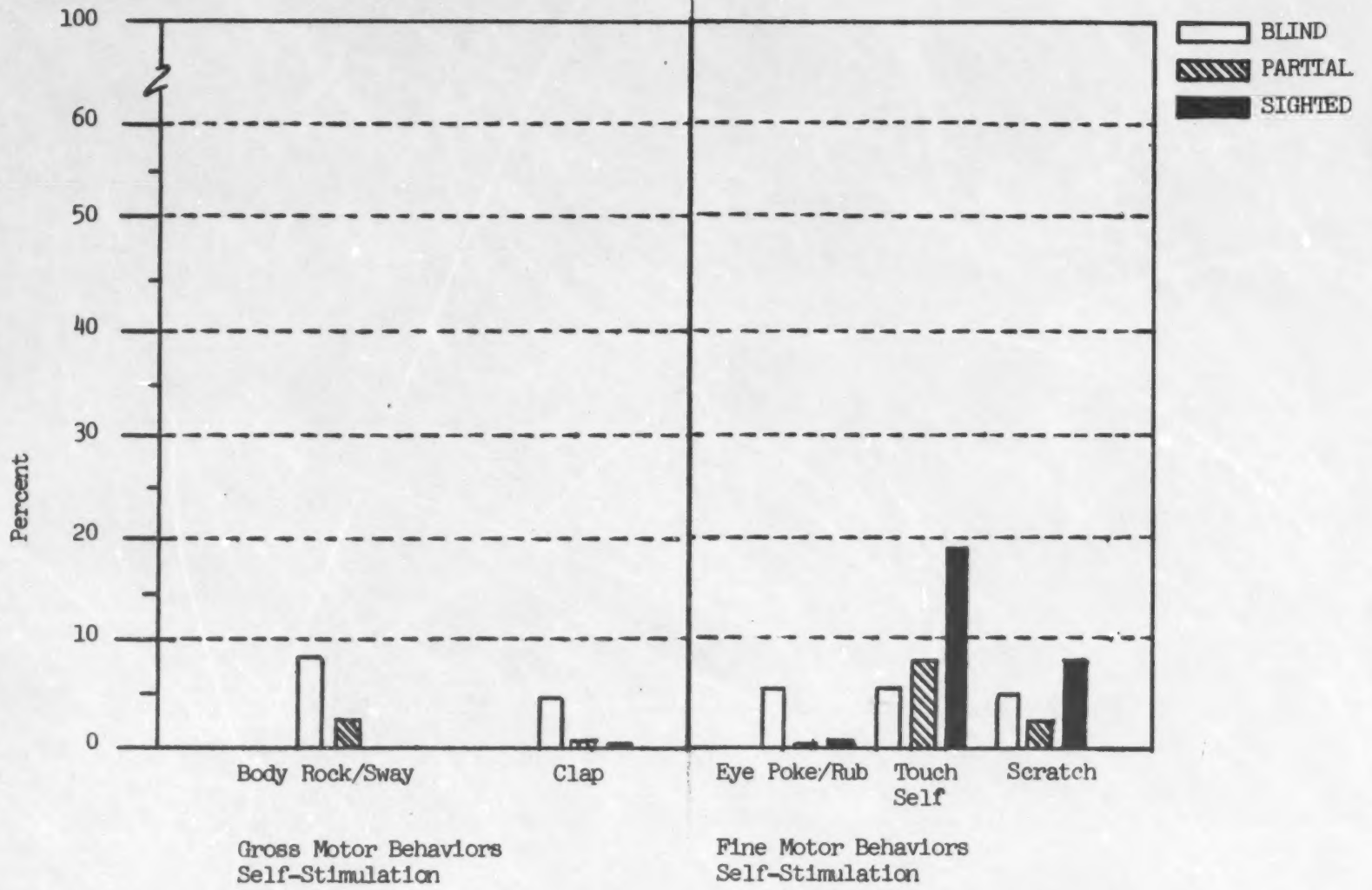


Figure 6 SELF-STIMULATION BEHAVIORS

Figure 6

Table 22

SELF-STIMULATION

Frequency and Percent of Observed Fine Motor Behaviors with Significant Chi Squares

Fine Motor Self-Stimulation	Subjects			X^2	p
	Blind	Partial	Sighted		
Eye poke/rub	21 (5.6%)	1 (0.3%)	3 (0.8%)	29.1138	0.0001
Touch self	20 (5.3%)	31 (8.5%)	71 (19.0%)	39.4722	0.0001
Scratch	20 (5.3%)	9 (2.5%)	32 (8.6%)	13.3462	0.0013

The three groups did not differ significantly at the .05 level for the following fine motor self stimulation behaviors: mouth, finger rub, hold self. Therefore, based on the above analyses the null hypothesis, there is no difference in the kind and frequency of fine motor self-stimulation behavior for the blind, partially sighted and sighted during instructional play, was rejected.

c. SELF-STIMULATION - CONTACT WITH SELF

Analyses were conducted on frequency of contact with their body for the three subject groups. The null hypothesis was: There is no difference in the frequency of contact of self for the blind, partially sighted, and sighted during unstructured play. The contact with self category consisted of body parts and clothes.

ANOVA was used to test the differences among groups for the frequency of contact with body and clothes. The results indicated that there was a significant difference among the groups at the .05 level ($F = 3.934$, $p = .0294$ (see Table 23). The results of the post hoc multiple comparison procedure indicated that the partially sighted and sighted were similar and the blind and sighted were similar. The greatest difference was between the sighted and the partially sighted subjects.

Therefore, based on the above analyses, the null hypothesis, there is no difference in the frequency of contact of body and clothes for the blind, partially sighted and sighted children during unstructured play, was rejected.

Table 23

CONTACT WITH BODY AND CLOTHES

	$\bar{X}$	SD
Blind	15.5833	6.0069
Partial	14.1667	4.5294
Sighted	19.9167	5.0535

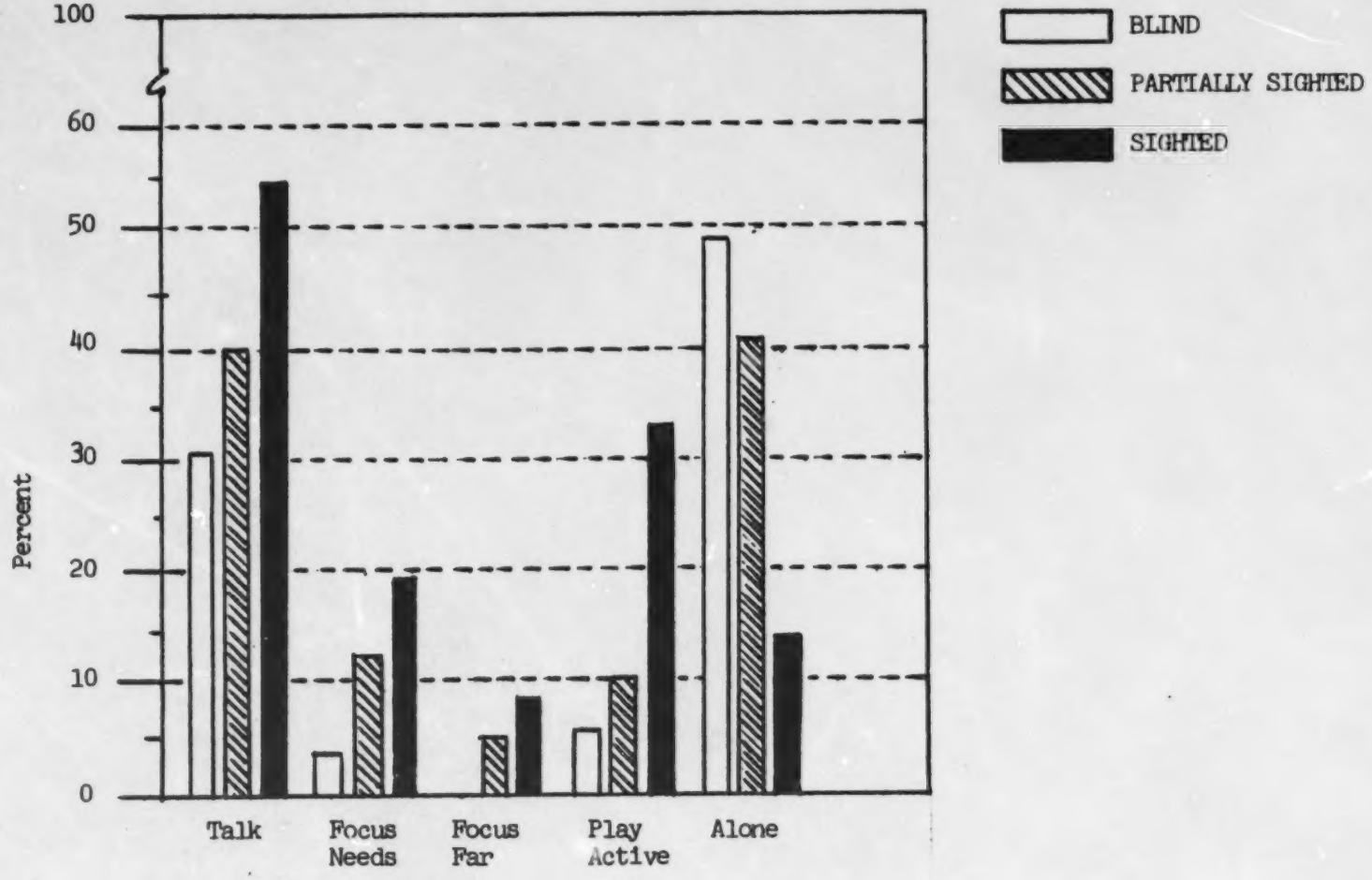


Figure 7 SOCIAL AND PLAY BEHAVIORS
Significant chi squares

Figure 7

4. SOCIAL AND PLAY BEHAVIORS

NULL HYPOTHESIS: THERE IS NO DIFFERENCE IN THE FREQUENCY AND KIND OF SOCIAL AND PLAY BEHAVIORS EXHIBITED BY BLIND, PARTIALLY SIGHTED, AND SIGHTED CHILDREN DURING UNSTRUCTURED PLAY FOR THE FOLLOWING:

a. PHYSICAL CONTACT
   1. CONTACT - FINE MOTOR
   2. CONTACT - GROSS MOTOR
b. SOCIAL BEHAVIORS
c. CONTACT WITH OTHERS

The Social and Play Behaviors category consisted of three subgroups.

Physical Contact:
(1) Contact - fine motor: touch, hold, pat, give/take
(2) Contact - gross motor: push/pull, hit, kick, grab/pinch, rough and tumble play

Social Contact:

(1) Vocalizations: sing, laugh, talk/listen, self-vocalizations
(2) Play: focus near, focus far, quiet cooperative play, active cooperative play, alone

Contact with Others: peers, adults

The following social and play behaviors were dropped because frequencies were five or fewer for two of the three subject groups: pat other, give/take, push, hit, kick, grab, rough tumble play, sing, laugh, and other.

a. PHYSICAL CONTACT

The physical contact category for both fine and gross motor was analyzed according to kind and frequency. The null hypothesis was: There is no difference in kind and frequency of fine and gross motor physical contact exhibited by the blind, partially sighted, and sighted

children during unstructured play.

ANOVA was used to test the differences among the groups for the kind and frequency of contact. The results indicated that there was no significant difference among groups at the .05 level.

Table 24

PHYSICAL CONTACT

Fine and and Gross Motor Behaviors

	Contact-Fine		Contact-Gross	
	$\bar{X}$	SD	$\bar{X}$	SD
Blind	9.5000	7.6811	0.4167	0.5149
Partial	6.1667	4.6677	0.9167	1.1645
Sighted	5.0833	2.2747	0.8333	0.5775

Therefore, based on the above analysis, the hypothesis: There is no difference in the kind and frequency of fine and gross motor physical contact for the blind, partially sighted and sighted children, was retained.

b. SOCIAL CONTACT

The social behavior were analyzed according to kind and frequency. The null hypothesis was: There is no difference in the kind and frequency of play behavior by blind, partially sighted and sighted during unstructured play.

ANOVA was used to test the differences among the groups for the kind and frequency of play behaviors exhibited. The results indicated that there was a significant difference among the groups at the .05 level, ($F = 17.238$, $p = 0.0001$).

Table 25

SOCIAL CONTACT

	$\bar{X}$	SD
Blind	31.4167	5.1603
Partial	37.6667	3.5505
Sighted	44.5833	7.1663

The results of the post hoc multiple comparisons procedure indicated that all three subject groups were different from each other. In order to further explore the differences among the groups on the specific play behaviors, chi square analyses were conducted on frequencies for each play behavior. Table 26 contains the play behaviors for which there was a significant chi square indicating a difference in the frequency for the groups. The three subject groups did not differ significantly at the .05 level for quiet play.

Based upon the results of the above analysis, the null hypothesis, there is no difference in the kind and frequency of play behaviors by blind, partially sighted, and sighted children, during unstructured play, was rejected.

Table 26

SOCIAL CONTACT

Frequency and Percent of Observed Behaviors
with Significate Chi Squares

Social Contact with Other	Subjects			χ^2	p
	Blind	Partial	Sighted		
Talk	117 (31.1%)	148 (40.4%)	205 (54.8%)	43.81427	0.0001
Focus Near	14 (3.7%)	45 (12.3%)	71 (19.0%)	42.64845	0.0001
Focus Far	0 (0.0%)	19 (5.2%)	33 (8.8%)	33.20651	0.0001
Play Active	22 (5.9%)	37 (10.1%)	123 (32.9%)	115.75157	0.0001
Alone	184 (49.0%)	150 (41.0%)	55 (14.7%)	105.75644	0.0001

c. CONTACT WITH OTHERS

The contact with other category was analyzed according to frequency. The null hypothesis was: There is no difference in the frequency of contact with others by the blind, partially sighted and sighted during unstructured play.

ANOVA was used to test for the difference among the groups for frequency of contact with others. The results indicated that there was a significant difference among the groups at the .05 level ($F = 7.443$, $p = 0.0021$).

Table 27

CONTACT WITH OTHERS

	$\bar{X}$	SD
Blind	27.0000	16.5858
Partial	34.4167	11.8970
Sighted	46.7500	8.0467

The results of the post hoc multiple comparison procedure indicated that the blind and partially sighted were different from the sighted but were not different from each other.

Based on this analysis, the null hypothesis, there is no difference in the frequency of contact with others by the blind, partially sighted and sighted children during unstructured play, was rejected.

C. ENVIRONMENT

The environment was divided into two categories and their subparts. They were: 1) location: hard surfaces, sidewalk, stone, grass and equipment; 2) environmental components: equipment, boundaries and objects. For detailed definition of each see Appendix C.

1. LOCATION

NULL HYPOTHESIS: THERE IS NO DIFFERENCE IN THE USE OF A SPECIFIC LOCATION BY THE BLIND, PARTIALLY SIGHTED, AND SIGHTED DURING UNSTRUCTURED PLAY FOR THE FOLLOWING:

a. LOCATION—FREQUENCY/SIGHT
b. LOCATION—FREQUENCY/AGE OR SEX

a. LOCATION - FREQUENCY / SIGHT

Location use was analyzed according to frequency. The null hypothesis was: There is no difference in the frequency of use of a specific location by the blind, partially sighted, and sighted during unstructured play.

The location stairs was dropped from analyses because frequencies for its use was low. ANOVA was used to test for the differences among groups for the frequency of use of locations. The results showed a significant difference at the .05 level (see Table 29). The post hoc multiple comparisons procedure for hard surfaces, grass and sidewalk resulted in the blind and partially sighted being different from the sighted but not different from each other. The multiple comparisons procedure for the equipment resulted in all three groups being different from each other.

Table 28

LOCATION

Significant ANOVAS by Sight
with Mean and Standard Deviation

	Hardsurface F=45.996 p=0.0001		Grass F=152.160 p=0.0001		Sidewalk F=25.915 p=0.0001		Equipment F=17.540 p=0.0001	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Blind	0.1166	0.3212	0.0154	0.1234	0.0858	0.2802	0.7136	0.4525
Partial	0.2178	0.4131	0.0350	0.1839	0.0795	0.2707	0.6296	0.4833
Sighted	0.0476	0.2131	0.2713	0.4449	0.0058	0.0758	0.7763	0.4170

Therefore, based on the above analyses the null hypothesis, there is no difference in the use of a specific location by the blind, partially sighted and sighted children during unstructured play, was rejected.

b. LOCATION-FREQUENCY/AGE AND SEX

The frequency of location was analyzed by sex and age. The null hypothesis was: There is no difference in the frequency of use of location by age or sex.

Two way analyses of variance were also run to determine if there were differences based upon the age and sex of the subject as well as to determine if there was an age by group or sex by group interaction. The results of the significant ANOVAS are presented in Tables 30 and 31.

Table 29

LOCATION

Significant ANOVAS by Sex
with Mean and Standard Deviation

	Hardsurface F= p=		Grass F=7.305 p=.0069		Sidewalk F= p=		Equipment F=7.944 p=.0049	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Male			0.0938	0.2917			0.7401	0.4388
Female			0.1333	0.3401			0.6814	0.4662

Table 30

LOCATION

Significant ANOVAS by Age
with Mean and Standard Deviation

	Hardsurface F=15.181 p=0.0001		Grass F=12.923 p=0.0001		Sidewalk F=30.940 p=0.0001		Equipment F=24.991 p=0.0001	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Group 1 7.5 to 9.4	0.738	0.2617	0.1414	0.3488	0.0102	0.1008	0.8197	0.3848
Group 2 9.5 to 11.4	0.1200	0.3251	0.1324	0.3391	0.0455	0.2085	0.6960	0.4602
Group 3 11.5 to 13.7	0.1911	0.3936	0.0489	0.2159	0.1222	0.3279	0.6156	0.4870

These results of the post hoc multiple comparisons procedure showed all three subject groups to be different from each other in their use of hardsurfaces, sidewalk, and equipment. The multiple comparisons procedure for grass resulted in group 2 (9.5 to 11.4) and group 1 (7.5 to 9.5) being different from group 3 (11.5 to 13.7) but not different from each other. Therefore, based on the above analyses the null hypothesis, there is no difference in the use of location by sex and age during unstructured play, was rejected.

2. ENVIRONMENTAL COMPONENTS

NULL HYPOTHESIS: THERE IS NO DIFFERENCE IN THE WAY BLIND, PARTIALLY SIGHTED AND SIGHTED CHILDREN USE ENVIRONMENTAL COMPONENTS DURING UNSTRUCTURED PLAY FOR THE FOLLOWING:

a. EQUIPMENT KIND AND FREQUENCY/SIGHT, AGE AND SEX
b. FREQUENCY USE OF BOUNDARIES/SIGHT, AGE AND SEX
c. FREQUENCY USE OF OBJECTS/SIGHT, AGE AND SEX

a. COMPONENTS - EQUIPMENT KIND AND FREQUENCY/BY SIGHT AGE AND SEX

The initial analysis of the environmental components was conducted in the kind and frequency of equipment. The null hypothesis was: There is no difference in kind and frequency of equipment use by the blind, partially sighted and sighted children during unstructured play.

The ANOVA was used to test for differences among groups for the kind and frequency of equipment use. The results indicated that there was a significant difference among the groups at the .05 level ($F = 12.269$, $p = 0.0001$; see Table 32). The results of the post hoc multiple comparisons procedure indicated that the blind and partially sighted subjects were different from the sighted subjects, but were not different from each other.

Table 31

EQUIPMENT USE

	$\bar{X}$	SD
Blind	36.4167	15.3413
Partial	29.8333	11.9760
Sighted	55.0833	11.1637

In order to further explore the differences among the groups on the specific equipment, chi square analyses were conducted on frequencies for each equipment piece. Table 33 contains the specific equipment piece for which there was a significant chi square indicating a difference in the frequency for the group.

Table 32

EQUIPMENT USE

Frequency and Percent

Equipment	Subjects: Blind	Partial	Sighted	X^2	p
MGD	40 (2.1%)	25 (1.3%)	0 (.0%)	46.12796	.0001
Slide	18 (.9%)	18 (.9%)	0 (.0%)	21.06383	.0001
Swing	162 (8.5%)	74 (3.9%)	0 (.0%)	225.58696	.0
T-Swing	3 (.2%)	51 (2.7%)	41 (2.2%)	38.80649	.0001
Sandbox	17 (.9%)	24 (1.3%)	35 (1.8%)	3.84057	.1466
Tree	2 (.1%)	1 (.1%)	180 (9.4%)	336.06494	.0
Fort	76 (4.%)	74 (3.9%)	237 (12.4%)	130.01190	.0001

The three subject groups did not differ significantly at the .05 level for the use of sandbox. Therefore, based on these analyses, the null hypothesis, there is no difference in the kind and frequency of equipment use by the blind, partially sighted, and sighted children during unstructured play, was rejected.

The two way analysis of variance was also run to determine if there were differences based upon the age and sex of the subjects as well as to determine if there was an age by group or sex by group interaction. There was no significant difference for the sex by group interactions. The age by group interaction was significantly different at the .05 level ($F = 4.192$, $p = .0239$, see Table 34).

Table 33

USE OF EQUIPMENT BY AGE GROUP

	$\bar{X}$	SD
Group 1 (7.5 to 9.4 yrs)	47.6667	14.3788
Group 2 (9.5 to 11.4)	43.0000	17.7034
Group 3 (11.5 to 13.7)	28.1111	9.4663

b. COMPONENTS - BOUNDARY FREQUENCY/SIGHT, AGE, SEX

The analysis of boundaries was based on frequencies of use. The null hypothesis was: There is no difference in frequency of use of boundaries by the blind, partially sighted and sighted children during unstructured play.

ANOVA was used to test for differences among groups for the frequency of use of boundaries. The results indicated that there was a significant difference among the groups at the .05 level ($F = 15.171$, $p = 0.0001$ see Table 35.) The results of the post hoc multiple comparisons procedure showed that the blind and partially sighted subjects were different from the sighted but were not different from each other.

Table 34

BOUNDARY USE

	$\bar{X}$	SD
Blind	13.2500	6.3407
Partial	15.1667	8.5049
Sighted	10.2222	1.6583

The sex by group and age by group interactions were not significant at the .05 level. Therefore, according to the above analysis the null hypothesis, there is no difference in the frequency of use of boundaries by the blind, partially sighted and sighted children during unstructured play, was rejected.

C. COMPONENTS - OBJECT FREQUENCY/SIGHT, AGE AND SEX

The analysis of the use of objects was done on frequencies. The null hypothesis was: There is no difference in the frequency of the use of objects by the blind, partially sighted and sighted children during unstructured play.

ANOVA was used to test for differences among the groups for the frequency of use of objects. The results indicated that there was no significant difference among groups at the .05 level, see Table 36.

Table 35

OBJECT USE

	$\bar{X}$	SD
Blind	28.9167	10.2908
Partial	29.0833	9.8115
Sighted	27.6667	9.1393

The sex by group and age by group interactions were not significant at the .05 level. Therefore, based on the above analysis, the null hypothesis: There is no difference in the frequency of the use of objects by the blind, partially sighted and sighted children, was retained.

VI. DISCUSSION

A. MOTOR PROFICIENCY

B. BEHAVIORS

1. GROSS MOTOR BEHAVIORS
   a. Gross Motor - Frequency and Kind
   b. Gross Motor - Diversity and Correlation to Motor Proficiency
   c. Gross Motor - Complexity and Correlation to Motor Proficiency
   d. Gross Motor - Active and Passive
   e. Gross Motor - General Discussion

2. MANIPULATIVE BEHAVIORS

3. SELF-STIMULATION BEHAVIORS
   a. Self-Stimulation - Behaviors
   b. Self-Stimulation - Contact with Self
   c. Self-Stimulation - General Discussion

4. SOCIAL AND PLAY BEHAVIORS
   a. Social and Play - Physical Contact
   b. Social and Play - Social Contact
   c. Social and Play - Contact with Others
   d. Social and Play - General Discussion

C. ENVIRONMENT

1. INTRODUCTION AND ENVIRONMENTAL ASSESSMENT

2. LOCATION
   a. Location - Use of Space
   b. Location - Gross Motor Behaviors
   c. Location - Relationship to Equipment
   d. Location - General Discussion

3. ENVIRONMENTAL COMPONENTS
   a. Components - Equipment and Boundaries/Sight
   b. Components - Equipment/Age
   c. Components - Complexity of Equipment/Complexity of Gross Motor Behaviors
   d. Components - General Discussion

VI. DISCUSSION

A. MOTOR PROFICIENCY

No motor proficiency tests with established norms were available for the visually impaired. The Bruninks-Oseretsky Test was selected because (1) it contained norms ranging from four and one-half years to fourteen and one-half years, and (2) it included items that were both fine and gross motor related. Only non-sight dependent test items were used. The extended age range was important because of the developmental delays generally seen in the visually impaired. A test was needed that would allow for a developmental lag in seven to twelve year olds and still provide age norms.

In reviewing the data it appeared that the test resulted in low motor proficiency age equivalents compared to chronological age for all subject groups.

Table 36

MOTOR PROFICIENCY

Age Average Score

	Mean Chronological Age	Mean Age Average for Motor Proficiency	Difference
Blind	10.4 yrs.	5.11 yrs.	5.29 yrs.
Partial	11.4 yrs.	5.75 yrs.	5.65 yrs.
Sighted	9.7 yrs.	8.47 yrs.	1.23 yrs.

As can be seen from Table 37, the blind and partially sighted children were clearly motorically delayed. This study would agree with these previous findings which indicate that there are selective lags found in the motor development of the visually impaired child. (Norris et al., 1957; Buell, 1965; Burlingham, 1965; Fraiberg, 1977)

The testing procedure was incorporated into the research design to establish a level of motor proficiency reflective of what the children can do. This base level of proficiency is necessary to determine if a child is capable of certain activities even if such behaviors are not exhibited by the child spontaneously. For example, the blind and partially sighted children measured between ages five and six on the motor proficiency test. Developmentally, children performing at age five level are capable of all of the gross motor behaviors observed. The difference in frequency and diversity of behaviors between the blind and partially sighted therefore cannot be attributed to the inability to perform those gross motor behaviors. It may be, as the literature suggests, more a lack of experience than ability. (Buell, 1965)

B. BEHAVIORS

1. GROSS MOTOR BEHAVIORS

The gross motor behaviors were initially analyzed for difference in frequency and kind. When significant differences appeared between groups by sight, further analysis was conducted to explore the nature of the differences. Analyses were run by diversity, complexity, and a correlation of these by motor proficiency; and by active and passive behaviors.

Table 37

GROSS MOTOR BEHAVIORS*

Behavior	Blind		Partially Sighted		Sighted		Total
	f	%	f	%	f	%	f
Stand	114	30.3%	172	47%	199	53.2%	485
Sit	202	53.7%	132	36.1%	99	26.5%	433
Walk	75	19.9%	116	31.7%	124	33.2%	315
Ride	93	24.7%	65	17.8%	18	4.8%	176
Squat	18	4.8%	25	6.8%	56	15%	99
Run	10	2.7%	27	7.4%	47	12.6%	84
Climb	7	1.9%	6	1.6%	31	8.3%	44
Jump	8	2.1%	10	2.7%	23	6.1%	41
Hang	1	.3%	12	3.3%	23	6.1%	36

* Sig. differences at .05 level.

a. GROSS MOTOR - FREQUENCY AND KIND

The results clearly indicate that there are significant difference in the frequency and kind of observed gross motor behaviors exhibited by blind, partially sighted and sighted children. ($F = 7.557$, $p = 0.0020$). For analysis of the gross motor category, the blind and partially sighted were different from the sighted children. The differences appear to be sight related since statistically significant differences do not appear across groups by age or sex.

The sighted children engaged in more gross motor behavior than did the blind and partially sighted children. For all groups, stand, sit and walk had high frequency. (See Table 38)

Run had a low frequency for all groups. This may be a surprise to some because it is often assumed that children spend a lot of their play time running. Large, grassy playgrounds reflect this bias. However, the sighted children's running frequency in this research is similar to other studies done on children's play. (Bowers 1975, Blakeley and Schneekloth 1975) "Play is not an athletic event." (Mayer Spivak, Note 2, 1976)

The blind and partially sighted children only outnumbered the sighted children in the cumulative frequency of two gross motor behaviors, sit and ride. Of 360 observations for the blind children, 53% of the time they were sitting compared to 26% for the sighted; the blind were sitting almost twice as much as the sighted. For the behavior, ride, the blind children again had the highest frequency. Ride as a category involved the body being moved through space on a piece of equipment such as a swing or merry-go-round, and as such was generally a "sit" on a moving object.

It appeared from the observations that two categories, stand and squat were being used differently by the visually impaired and sighted children. For the sighted children, standing occurred in 53% of the observations. The observed occurrence for the blind was 30% and the partially sighted, 47%. For the visually impaired, stand was used primarily as a stationary gross motor activity, while for the sighted it appeared to be a transitional behavior for such activities as run, walk, jump, etc. Squat appeared to be a sight-dependent behavior which the sighted children often used to examine some object on the ground.

Because the data were taken in time sampling form, explanations for differences are suggestive rather than conclusive. Data need to include durations with antecedents and consequences before conclusive statements can be made.

b. GROSS MOTOR - DIVERSITY AND CORRELATION TO MOTOR PROFICIENCY

The ANOVA for diversity of gross motor behaviors showed a significant difference between the groups at the .05 level ($F = 10.601$, $p = 0.0003$). The mean diversity for the sighted children was eleven and one-half behaviors while the blind and partially sighted children exhibited a mean of eight and nine behaviors, respectively. The sighted children exhibited a slightly higher frequency of gross motor behaviors and they did show a wider diversity of behaviors, i.e., more different kinds of behavior for each observation.

The correlation coefficient for frequency and diversity of gross motor behaviors and the motor proficiency level for the combined subject groups ($N = 36$) was significant at the .05 level ($r = 0.47955$, $p = 0.0031$). These results indicate that the higher the motor proficiency age equivalent score, the higher the frequency and wider the diversity of gross motor behaviors.

The visually impaired children are demonstrating the motor proficiency age equivalent level of 5.11 and 5.75. With normal development, a child with this level of ability would be ending his sensori-motor period. He would however be maintaining a high level of hands-on

environmental exploration and interaction, practicing his repetoire of motor skills. In this study, the visually impaired children exhibited fewer gross motor behaviors and fewer environmental interactions. Clearly this is not in the interest of the healthy development for these children because of their extreme dependency on direct contact with the environment.

c. GROSS MOTOR - COMPLEXITY AND CORRELATION TO MOTOR PROFICIENCY

To further explore the differences between the groups, the gross motor behaviors were grouped according to their developmental complexity, from least to most complex.

Level 1	Level 2	Level 3
stand	ride	jump
lean	slide	run
sit	walk	other loc. on ft.
lie	scuttle	climb
	squat	crawl
		hang

As in the case of diversity, the sighted subjects showed significantly more complex behaviors ($F = 10.359$, $p = .0003$) than the visually impaired children.

When correlating the complexity level of the groups to the motor proficiency level as measured by age average scores, it was significant for all three subject groups. The more complex behaviors were exhibited by the children with the higher motor proficiency scores.

d. GROSS MOTOR - ACTIVE AND PASSIVE

The literature suggests that the blind child is passive, content to sit, and motorically idle. Yet no one has adequately defined the term "passive." In the literature, passivity is used in two ways:

(1) The tendency to engage in more "passive" motor behaviors (i.e., those that are stationary) or,

(2) The tendency to engage less frequently in all activities.

In order to test the first definition, the gross motor behaviors were grouped into active (locomotor) behaviors:

walk, run, jump, climb, hang, scuttle, crawl, and passive (stationary) behaviors: stand, sit, lie, lean, squat. The analysis of variance showed a significant difference among groups for active gross motor behaviors at the .05 level ($F = 20.521$, $p = 0.00001$). The sighted children showed the highest level of active gross motor behavior with a mean of 22 behaviors. The partially sighted were next with a mean of 14 active gross motor behaviors, followed by the blind with a mean of nine behaviors.

Table 38

GROSS MOTOR BEHAVIORS

Active and Passive

	Blind	Partially Sighted	Sighted
	mean	mean	mean
Active/Locomotor	9.3	14.8	22.0
walk			
run			
jump			
climb			
hang			
scuttle			
crawl			
Passive/Stationary	22.5	25.4	32.0
stand			
sit			
lie			
lean			
squat			

The multiple comparisons procedure for the active gross motor behaviors showed all three groups to be different from each other unlike all previous analysis of the gross motor category where blind and partially sighted were grouped as being similar. Bauman and Yoder (1966) have stated that even a small amount of vision greatly facilitated travel. This may be an explanation as to why the partially sighted subject are not similar to the blind for the active gross motor behaviors.

The analysis of variance on the passive gross motor behaviors resulted in a significant difference among groups at the .05 level, ($F = 8.527$, $p = 0.0010$). The sighted again had the highest mean frequency for passive gross motor behaviors. The multiple comparisons procedure showed that the blind and partially sighted were different from the sighted but not different from each other.

The sighted children engaged in a higher frequency of both active and passive behaviors. This data would indicate that the first definition of passivity for blind children, i.e., the tendency to engage in passive behaviors, may not be accurate. However, the second definition, less frequency of all activities, may have some validity. More research needs to be done on "the passivity of the blind child" before the term can be used in a truly descriptive way.

e. GROSS MOTOR - GENERAL DISCUSSION

Differences between groups by sight were significant at all levels of analysis. Not only did the sighted children exhibit more gross motor behaviors than the visually impaired, but they also had a greater diversity and complexity of behaviors.

The research supports previous work (Fraiberg 1977, Buell 1950) which suggest that visually impaired children are not functioning as well as sighted children motorically. Cited as reasons for this delay are lack of sufficient environmental stimulation because the visual stimuli is not perceived (Jastrzembska 1976); a natural tendency to protect the self (Burlingham 1965); and over-protection by adults (Warren 1977).

The differences in gross motor behaviors between the sighted and visually handicapped may have developed because the visually impaired are often dependent on other people to access the physical environment in a gross motor mode. Sighted children take advantage of their everyday environment to play and consequently perfect their gross motor skills. The structure of the everyday environment of the blind child may be the same, but the opportunity to interact freely and to experiment is not perceived.

Without early practice with the encouragement of parents and teachers, and without physically safe, but exciting environments to serve as stimulating and self-rewarding opportunities, there is no reason to expect an age average level of gross motor behaviors.

Our data suggest that the lack of practice of gross motor behaviors, limited experience in environmental interactions in accessible and exciting environments and the lack of recognition of the importance of such activities on the part of the caretakers of these children, may be contributing to the delays in gross motor behaviors seen in the visually impaired.

2. MANIPULATIVE BEHAVIORS

The results of analysis indicated that there were no significant differences at the .05 level between groups for frequency or diversity of the manipulative category.

Table 39

MANIPULATIVE BEHAVIORS

Frequency and Percent

	Blind		Partially Sighted		Sighted		Total Frequency
	f	%	f	%	f	%	f
Fine							
finger/explore*	87	23%	58	16%	63	17%	208
touch	110	30%	101	28%	117	31%	328
hold*	131	35%	145	40%	102	27%	378
grasp	119	32%	91	25%	109	29%	319
put/drop*	9	2%	22	6%	16	4%	47
open/twist	6	2%	4	1%	7	2%	17
eat/drink*	27	7%	53	14%	17	5%	97
Gross							
kick	1	.3%	1	.3%	4	1%	6
throw*	6	2%	18	5%	9	2%	33
strike/dig	14	4%	8	2%	16	4%	38
push/pull*	67	18%	72	20%	37	10%	176
carry	3	1%	5	1%	5	1%	13
lift	2	.5%	1	.3%	14	4%	17
bounce*	2	.5%	31	9%	8	2%	41
Hands							
reach out	6	2%	3	1%	11	3%	20
at rest*	4	1%	28	7%	62	17%	97

* Sig. at .05 level

This study does not support the work of Tait. Tait (1972) compared the play behaviors of the sighted and the blind child and found that the blind children engaged in more manipulative play than the sighted children. However, it is not known from Tait's data how much the blind children actually handled objects since she described handling of objects with dramatization as engaging in dramatic play and not as manipulative play.

Looking at the frequencies of the manipulative behaviors (Table 40), it is interesting to note that the partially sighted children had a higher frequency count than the blind and sighted, even though not statistically significant. This is different from the frequencies on gross motor behaviors where either the sighted children or blind children were highest, with the partially sighted maintaining the middle position. The partially sighted children again have higher frequencies than the blind children on many behaviors further supporting Bauman and Yoder's claim that any vision plays an important part in manipulative tasks (Bauman and Yoder 1966).

Table 40

MANIPULATIVE BEHAVIORS

Four Most Frequently Exhibited

Blind	f	%
hold	131	35%
finger/explore	87	23%
push/pull	67	18%
eat/drink	27	7%
Partially Sighted		
hold	145	40%
push/pull	72	20%
finger/explore	58	16%
eat/drink	53	14%
Sighted		
hold	102	27%
finger/explore	63	17%
at rest	62	17%
push/pull	37	10%

Table 41 lists the four most frequent behaviors for each group. Although the order is not the same, three behaviors were consistent for the visually impaired and sighted children: hold (being in contact); finger/explore (active manipulation of an environmental component with hands) and push/pull (exerting force on object). The other most frequent behavior was different for the sighted

and visually impaired. Both the blind and partially sighted had eat/drink for their 4th most frequently exhibited behavior (7% and 14% respectively), and the sighted had at rest for their third.

The behavior, at rest, occurs 17% of the time for the sighted. (Blind 1%, partially sighted 7% - statistically significant $X^2 = 58.9245$, $p = 0.00001$). The sighted children often had hands in a relaxed position either lying at their side or in their lap. It appears that the hands of the visually impaired children are not often relaxed but are constantly in motion, either in active exploration, self-stimulation or general fidgeting. Perhaps the different level of total stimulation received could account for the hands in constant motion seen in the blind. This area needs further research to determine more clearly how the visually impaired are using their hands - i.e., how much of their manipulated activity is purposeful and how much is a form of self-stimulation used perhaps to increase the general level of total stimulation.

The correlation coefficients for frequency and diversity of manipulative behavior to motor proficiency were not significant for the combined subject groups ($N = 36$). The motor proficiency test does not appear to be a predictor of manipulative behaviors.

MANIPULATIVE - GENERAL DISCUSSION

It is important to note that there are no differences between the subject groups in kind, frequency and diversity of manipulative behaviors. We hypothesize that the difference between gross motor and manipulative behavior in the visually impaired is a result of differences in experience. The blind and partially sighted children are presented with ample opportunity to engage in manipulative tasks. As discussed earlier, the nature of a visual impairment can result in the dependence of the child on other people or the structure of the environment for the opportunity to practice gross motor skills. This is not the case for manipulative tasks, which can be practiced anywhere in a stationary position.

The behavior, reach out was included specifically for the blind children who were being taught to use their hands in front of them as guides through the environment. It was noted that they did exhibit this behavior frequently in their classroom situation. However, it was seldom seen during unstructured play (blind, 2%, partially sighted 1% and sighted 3%). This behavior, obviously, has not been integrated, and is not used as a mobility aid. Our observations suggest that the blind children may be reaching more with their feet than hands. However, the data were not taken on different kinds of walks, i.e., walk quickly, shuffle, etc.), and so our comments are very tentative.

Clearly, more research should be done in exploring the relationship between manipulative behaviors, locomotor behaviors and mobility.

BLIND CHILD LEADING WITH FEET

3. SELF-STIMULATION BEHAVIORS

Self stimulation was included because of concern regarding the stereotypic behaviors of the visually impaired. These behaviors tend to inhibit successful social integration of the blind child and often indicate an insufficient amount of external stimulation for the child. Fraiberg feels that the stereotypic behaviors are residual patterns left from delayed mobility and serve to further limit the child's potential to actively explore the environment and learn about the world. Piaget contends that the extent to which self-manipulation continues, that environmental exploration will be inhibited.

For the purpose of this study, we used the category of self-stimulation to refer to all behaviors that are directed to auto-manipulation of self, body or clothes. This category included behaviors often termed "blindisms" such as rocking, eyepoking, headshaking, bouncing in place, clapping and chestbeat.

a. SELF-STIMULATION - BEHAVIORS

Very few of the total behaviors of the children were self-stimulative, stereotypic or otherwise. Of the approximately 6000 behaviors, 532 were self-stimulation, 96 stereotypic. (See Table 42)

Table 41

SELF-STIMULATION BEHAVIORS

	Stereotypic		Total Self-Stimulation	
	f	%	f	%
Blind	72	1.2%	206	3%
Partially Sighted	13	.2%	141	2%
Sighted	8	.1%	185	3%
	96	1.6%	532	8.9%

There were significant difference between groups for both gross motor self-stimulation and fine motor self-stimulation behaviors. (See Table 43.) The two behaviors in the gross motor category, body rock and clap, can be classified as stereotypic. The blind had the highest frequency for each. When certain behaviors for fine self-stimulation were analyzed, the one behavior which could be classified as stereotypic, eye poke, had the highest frequency for the blind. Touch self and scratch were seen most frequently in the sighted.

Table 42

SELF-STIMULATION BEHAVIORS

Frequency and Percent

	Blind		Partially Sighted		Sighted		Total Frequency
	f	%	f	%	f	%	f
*Gross Motor							
*body rock/sway+	32	6%	9	3%	0	0%	41
jump+	1	.3%	0	0	2	.5%	3
bounce+	11	3%	1	.3%	3	1%	15
headshake+	6	2%	0	0	0	0	6
chest beat+	4	1%	0	0	0	0	4
*handshake/clap+	15	5%	3	.8%	1	3%	19
*Fine Motor							
face rub	4	1%	3	1%	3	1%	10
*eye poke/rub+	21	6%	1	.3%	3	1%	25
mouth	12	3%	14	4%	9	2%	35
*touch(once)	20	5%	31	9%	71	19%	122
finger/rub	43	11%	26	7%	34	9%	103
hold	18	5%	12	3%	21	6%	51
*scratch	20	5%	9	3%	32	9%	61
Total							

*Statistically significant at .05 level
+defined as stereotypic for blind children - "blindisms"

Guess (1966) found in his research that the frequency of self-manipulatory behaviors was inversely related to the frequency of environmental manipulation. In order to test out this hypothesis, we attempted a chi square to determine if there were significant differences in stereotypic behaviors with and without manipulables. We were unable to arrive at any statistical results because there were fewer than 5 in two of the cells. However, simple frequencies and percentages tend to question Guess' statement. Caution must be used, however, because of the low sample and low frequencies.

Table 43

STEREOTYPIC BEHAVIOR

With and Without Environmental Manipulation

	Without Manipulables		With Manipulables		Total	
	f	%	f	%	f	%
Blind	18	19%	57	59%	75	78%
Partially Sighted	4	4%	9	9%	13	14%
Sighted	2	2%	6	6%	8	8%
	24	25%	72	75%	96	100%

b. SELF-STIMULATION - CONTACT WITH SELF

Self-stimulation implies either that the body, parts of the body or clothes are being manipulated or that the body is being moved randomly or repetitively without any environmental interaction as seen in the behavior, rocking.

Whenever a self-stimulation behavior was observed, its environmental counterpart was also recorded. An ANOVA resulted in significant differences between groups in the amount of self contact with the sighted children having a mean of 19.9, the blind, a mean of 15.5 and partially sighted, 14.1. The frequencies and percentage of behaviors indicate that the sighted children contacted themselves more frequently than the other two groups.

Table 44

CONTACT WITH SELF

Frequency and Percent

Self Contact	Blind		Partially Sighted		Sighted		Total
	f	%	f	%	f	%	f
Body Parts	102	17%	68	11%	165	28%	335
Clothes	19	3%	43	7%	47	8%	109
Self	66	11%	59	10%	27	5%	152
Total	187	31%	170	29%	239	40%	596

c. SELF-STIMULATION - GENERAL DISCUSSION

The data resulted in significant differences in self-stimulation behaviors between groups, but not necessarily as we expected. The sighted children engaged in as much self-stimulation activity as did the blind and partially sighted. This suggests to us that the behaviors may be normal and necessary for all children.

Our data are limited, however, because we do not have durations and sequences of behaviors. Our observations suggest that it may not be the frequency of self-contact which is different between groups, but rather the kind of contact, the randomness of the contact and the duration of the activity. We did not find that environmental manipulation and self-stimulation were inversely related but again a small sample size suggests caution in using the data.

Clearly, this is a very important area in the development of visually impaired children and further research must be done to determine the qualitative differences of self-stimulation.

4. SOCIAL AND PLAY BEHAVIORS

So often environmental interaction occurs in a social context. The environment is used as a prop for play, fantasy, and games. It is also used as a retreat to be away from other children; or for a small group to isolate itself from the larger gang.

Because we were interested in whether or not there were differences in the environmental interactions of blind, partially sighted and sighted children, we felt it important to look also at the context in which they are involving themselves in the environment. For the purposes of observations, the Social and Play Behaviors category was divided into three subgroups:

a. Physical Contact - referring the actual touching of one child by another.

b. Social Contact - the extent of verbal interaction and kind of play (cooperative, observational, alone).

c. Contact with Others - peers or adults.

a. PHYSICAL CONTACT

There was no significant differences in physical contact fine and gross, between the blind, partially sighted and sighted children. The physical contact between children in all groups appears to be similar. (See Table 46.)

It is interesting to note that only two of the physical contact behaviors, touch and hold, occur with any frequency, 14% and 7% respectively. In an chi square analysis, both of these behaviors were significant at .05 level with the blind children being in physical contact with others more often than the partial or sighted.

The Physical Contact - Gross Motor category had very few observations for all groups. Most of these behaviors, with the exception of rough and tumble play, would have indicated a negative exchange between children. The data suggest that none of the groups engaged in much anti-social behavior.

Table 45

SOCIAL AND PLAY BEHAVIORS

Frequency and Percent

	Blind		Partially Sighted		Sighted		Total	
	f	%	f	%	f	%	f	%
A. Physical Contact								
1. Fine								
+touch(p=.02696)	65	17%	39	11%	48	13%	152	14%
+hold(p=.0000)	43	11%	25	7%	6	2%	74	7%
pat	1	.3%	3	.8%	0	0%	4	.4%
give/take	2	.5%	6	2%	5	1%	13	1%
2. Gross								
push/pull	3	.8%	4	1%	5	1%	12	1%
hit	0	0	4	1%	2	.5%	6	.5%
kick	1	.3%	0	0	1	.3%	2	.2%
grab/pinch	0	0	0	0	1	.3	1	.1%
rough & tumble	1	.3%	3	.8%	1	.3%	5	.4%
B. Social Contact								
1. Vocalization								
sing	7	2%	6	2%	0	0	13	1%
laugh	6	2%	6	2%	9	2%	21	2%
talk/listen*	117	31%	148	40%	205	55%	470	42%
self-vocalization	45	12%	19	5%	16	4%	80	7%
2. Play								
focus near*	14	4%	45	12%	71	19%	130	12%
focus far*	0	0	19	5%	33	8%	52	5%
quiet Cooperative play	25	7%	40	11%	34	9%	99	9%
active cooperative play	22	6%	37	10%	123	33%	182	16%
alone*	184	49%	150	41%	55	15%	389	35%
C. Contact with Others*								
peers	215		329		539		1083	
adults	109		84		22		215	

*Statistically significant at .05 level

b. SOCIAL CONTACT

The ANOVA for the category Social Contact was significant at the .05 level with all three groups different from each other. The chi square analysis for each behavior showed that talk, focus near and far, active cooperative play and alone were all significant. (See Table 47.)

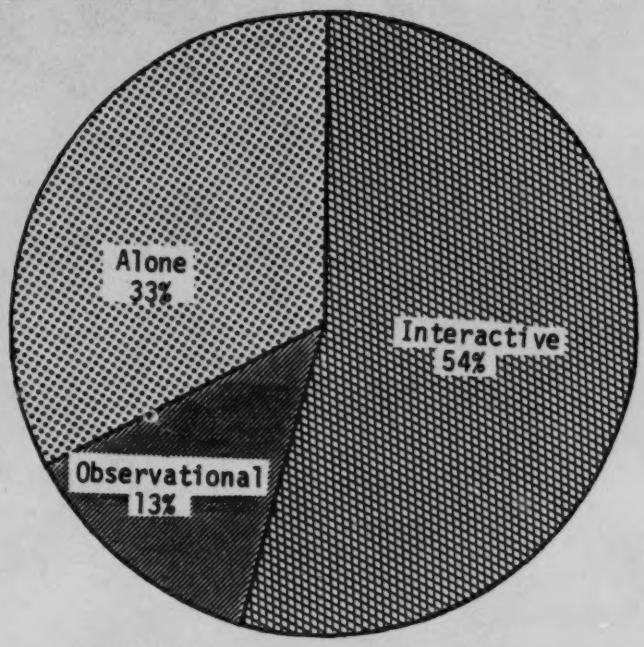
When behaviors were grouped according to level of interaction, an interesting pattern emerges. (See Figure 8)

Table 46

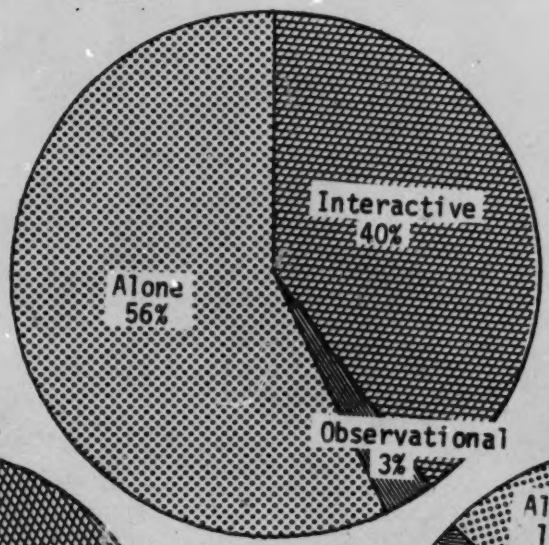
SOCIAL CONTACT

Level of Interaction

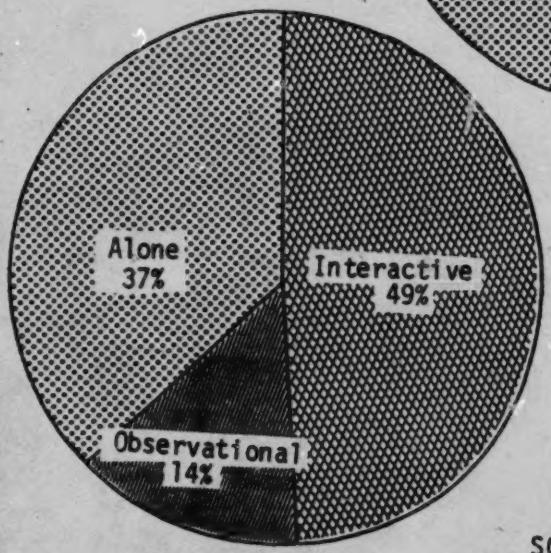
	Blind		Partially Sighted		Sighted		Total	
	f	%	f	%	f	%	f	%
Interactive (talk, quiet cooperative and active cooperative play)	164	40%	225	49%	362	67%	751	54%
Observational (focus near, focus far)	14	3%	64	14%	104	19%	182	13%
Alone (alone, self-vocalization)	229	56%	169	37%	71	13%	469	33%
Totals	407		458		537		1402	



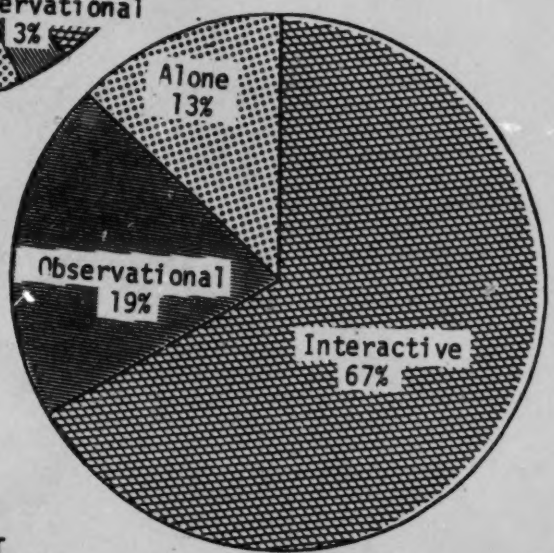
All Groups N = 36



Blind
N=12



Partially Sighted
N=12



Sighted
N=12

SOCIAL CONTACT
LEVEL OF INTERACTION

The observing others behavior was recorded when a child's body or head was oriented toward another in an attentive posture. For the partially sighted and sighted children this also included the orientation of the eyes. As one would expect, the blind children spent very little time observing others. (3%)

Children are often drawn into social interaction through visual stimulation which attracts them to another child or activity. Even without this external motivation, the blind children spend 40% of their time interacting with others. (Partially sighted - 49% and sighted 67%). Nevertheless they spent most of their time alone (56%) while the sighted children were alone for only 13% of the time.

Quiet cooperative play for all groups was not significantly different - each engaging in the same frequency of such play. However, there was a significant difference in the amount of active cooperative play which usually involved running and active gross motor activities. The data from the Gross Motor Behavior category would support the observation that there was greater frequency of locomotor behaviors by the sighted than the visually impaired.

ADULT INTERACTION (VSDB)

c. CONTACT WITH OTHERS

There was a significant difference in the contact with others among the three groups at .05 level. The multiple comparisons procedure showed that the blind and partially sighted children were alike, and different from the sighted. The mean frequency for the sighted was 46, partially sighted 34 and blind 27. This is consistent with the Social Contact data which showed that the sighted children engaged in more interactive behaviors than the other groups and so naturally would have contact with more "others."

Whenever a child was interacting with another person, it was recorded whether that other was an adult or peer. There were, of course, more peers available for interaction than adults, and that is reflected in the data with greater frequencies for all groups with peers. But there were always adults present in each play area: the four researchers, and at least one to three other caretakers who were there specifically to watch the children in both environments. (See Table 46.)

Of the observations involving others, the blind spent considerably more time interacting with adults (34%); sighted spent almost no time with adults (4%) and the partially sighted were again in the middle (20%).

d. SOCIAL AND PLAY - GENERAL DISCUSSION

The amount of physical contact between groups was not significantly different. However, the amount of interaction vs. alone was different, with the blind spending much more time alone than the sighted and partially sighted. The greater interaction of the sighted children can be accounted for by the greater amount of talking (sig. at level .05) exhibited by the sighted children. They were interacting more because they were talking to each other more and apparently did not have to be in physical contact when conversing.

A next step in the research would be to investigate how much the blind children talk to each other when they are in physical contact and when they are not. Our data would suggest that the two may be related.

C. ENVIRONMENT

1. INTRODUCTION AND ENVIRONMENTAL ASSESSMENT

A basic assumption of this research is that there is a relationship between the behavior of people and the environment they inhabit. Behavior occurs in space, in a specific physical context, which "may impose major constraints in the range of possible behaviors and serve to determine particular aspects or patterns of individual action." (Moos 1973, p. 653) As teachers, designers and others manipulate space and the objects in it, they to some extent manipulate behavior.

This research aspires to ecological validity; i.e., it attempts to examine behaviors and context, and the interaction between the two. Ecological psychologists (Barker 1973, Lewin 1956, Caldwell 1967, Gump 1973) stress that the ecological environment must be assessed independently of the behavior of the individual before an assessment of the interaction is possible. To speak of the context in terms of the points of contact only denies the concept of opportunity. What children choose to do in an environment is naturally dependent on the opportunities available. If some research finds that children are passive in a specific setting, it may be choice or it may be that there is nothing to do.

To avoid the tautology of reporting behaviors without independently reporting the potentials for such behavior to occur, this research has analyzed the environment available to the children at each school and made some judgements on the kind of environment, and the appropriateness of available playthings using complexity as the measure of appropriateness.

Within the constraints of the research, there was no way we were able to use the same environment for all three groups of children. However, we did try to keep the same opportunities available at the Virginia School for the Deaf and Blind and the Blacksburg New School.

Both schools had:

a. Open Space - hard, compact, flat surfaces, large enough for running and games; and grassy areas that were suitable for rolling, sitting, etc.

b. Transitional Space - stairs, sidewalks.

c. Equipment - large play apparatus, large manipulable pieces, small objects, natural materials, etc.

All of the play equipment was rated by the Play Object Complexity Scale (POCS) developed by Schneekloth (1976). In this scale, a piece of equipment is not measured for its functional use to children, i.e., whether it supposedly allows climbing, jumping, etc. Instead, the description of play objects developed is based on the physical characteristics of these objects with no explicit reference to their function. This allows for a comparison among pieces of equipment otherwise not available. Such description also eliminates conjecture and inference on the part of an evaluator as to how many ways a child could interact with a play object. Such speculation always relies heavily upon the experience and imagination of the individual evaluator.

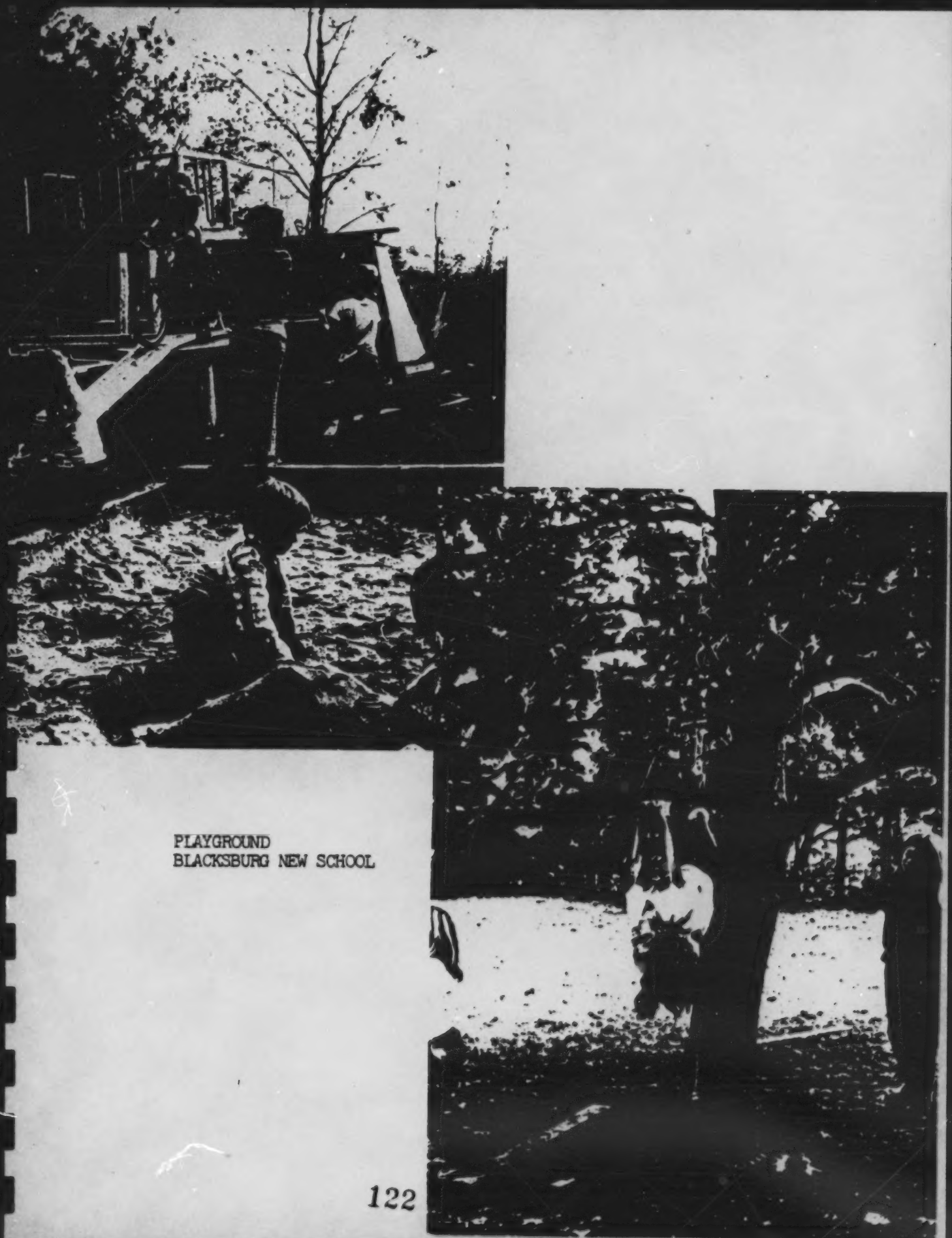
The categories chosen for the scale comprise an index of selected physical features which appear to be relevant to the responses of children to physical objects. Complexity was selected as the most valuable overall characteristic because the literature suggests it elicits exploratory behaviors and play as well as lessens the effects of habituation.

Each piece of equipment on both playgrounds were rated by POCS, Level I being the least complex, Level III the most complex.

Table 47

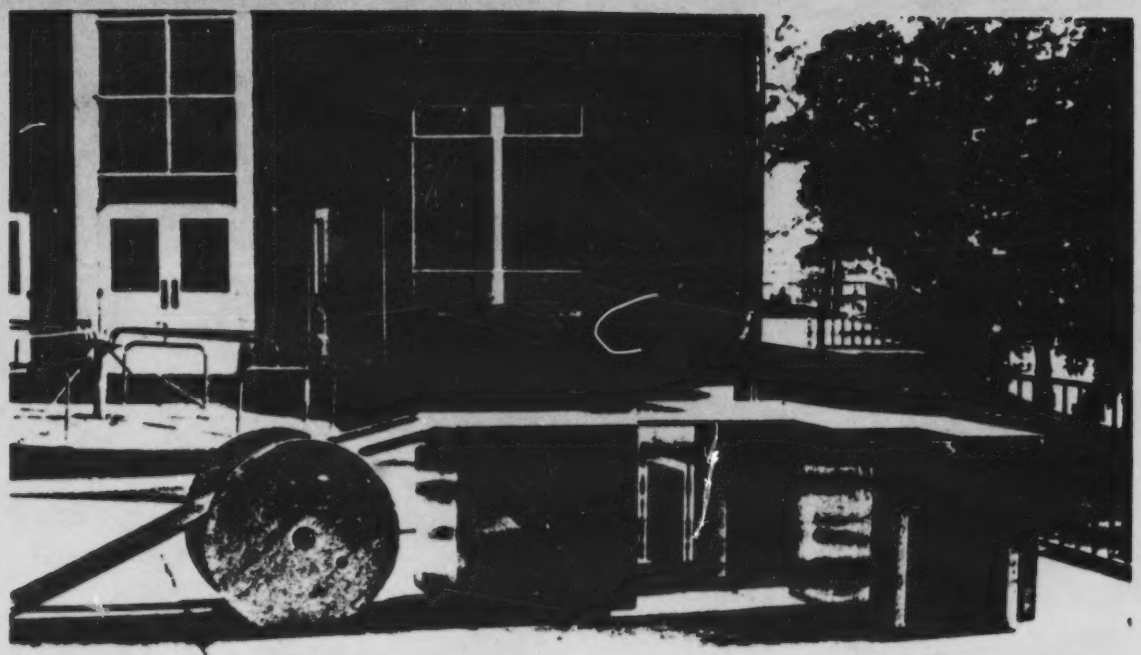
AVAILABLE EQUIPMENT

	Va. School for the Deaf and Blind	Blacksburg New School
Level of Complexity	f	f
I	5	3
II	4	3
III	2	2
Total	11	8

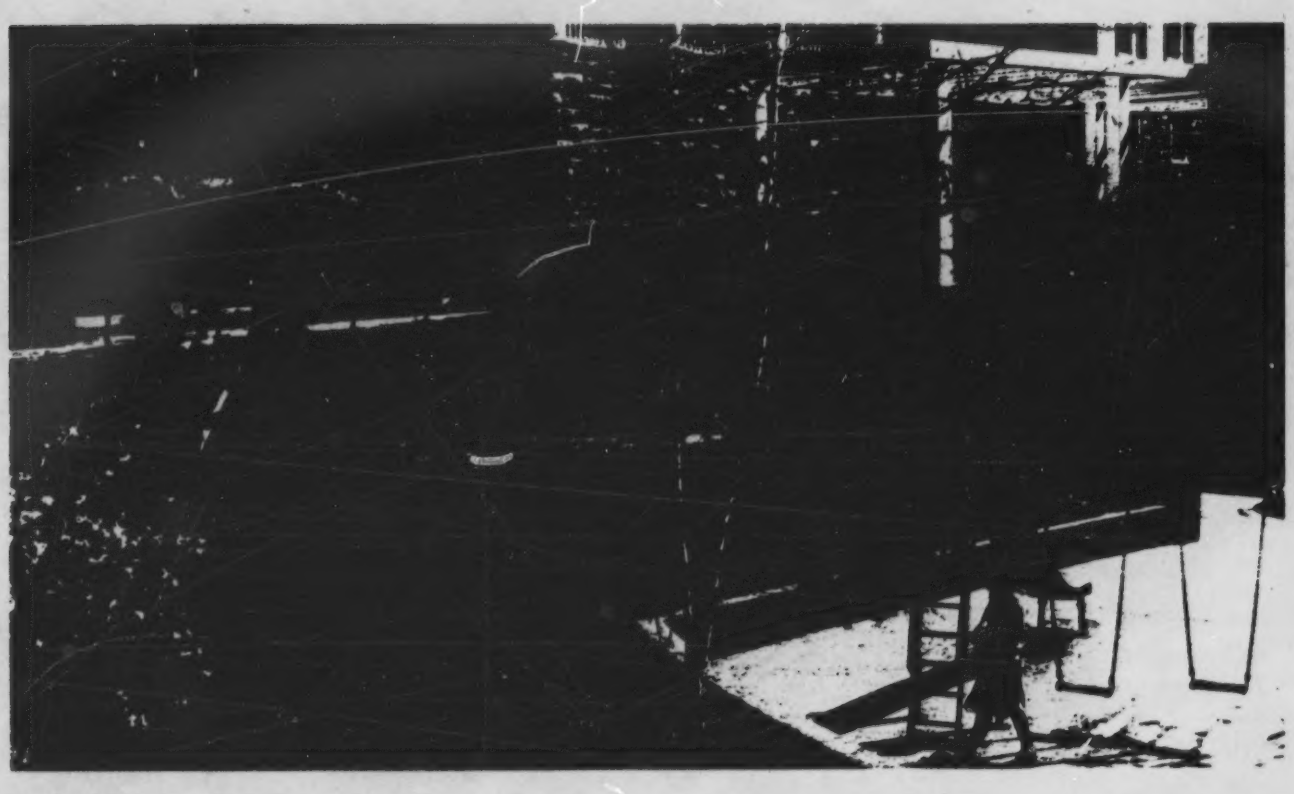


PLAYGROUND
BLACKSBURG NEW SCHOOL

As can be seen in Table 48, there were more separate objects at VSDB. However, it is important to note that the Fort (level III) at BNS was more complex and offered more diverse opportunities for play more than equalizing the number of experiences available.



PLAYGROUND AT BLIND SCHOOL
VIRGINIA SCHOOL FOR THE DEAF AND BLIND



2. LOCATION

a. LOCATION - USE OF SPACE

We were interested in determining whether the children used all available space equally (i.e., were they randomly distributed in space), or were there preferences which resulted in grouping. The data clearly show that there was discrimination in the use of space with the equipment being used more than twice as often (68%) as the rest of the play environment for all groups. The children located themselves around objects.

The use of location was significant of the .05 level by sight. The children were using parts of the play environment with different frequency. When the frequencies for location are grouped according to the Kind of Space, the differences become clearer. (See Figure 9)

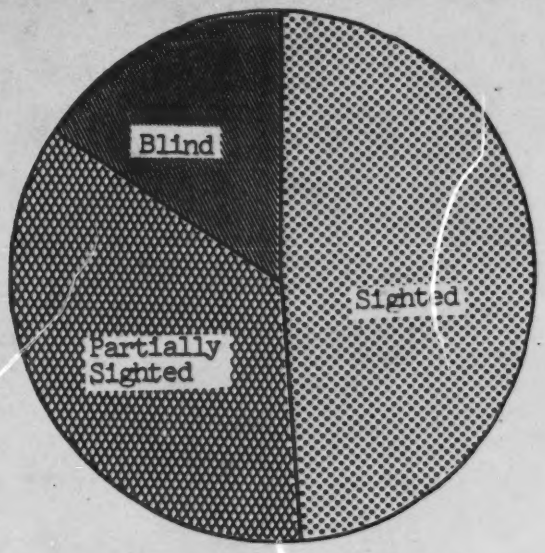
Table 48

LOCATION

Frequency & Percentage

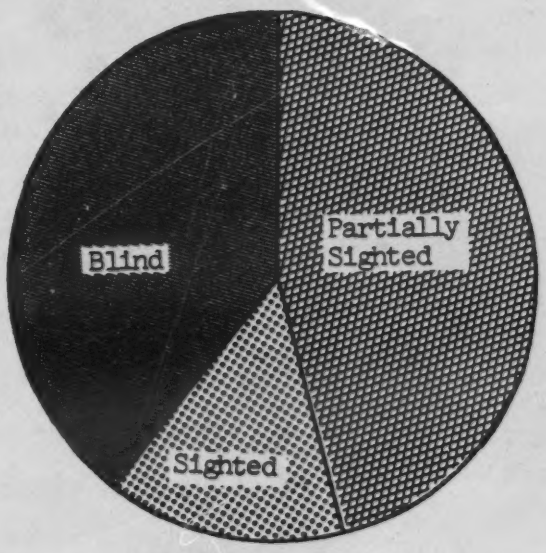
	Blind		Partially Sighted		Sighted		Total	
	f	%	f	%	f	%	f	%
Open Space (grass/hard)	77	14%	157	25%	221	28%	457	23%
Transitional Space (sidewalk, stairs)	67	12%	81	13%	26	3%	175	8%
Equipment & Objects	416	74%	396	62%	538	69%	1350	68%
	560		636		785		1983	100%

All of the groups used the equipment most and the transitional space least. However, real differences occurred in the use of Open Space, with the sighted children using it 48% of all reported observations and the blind



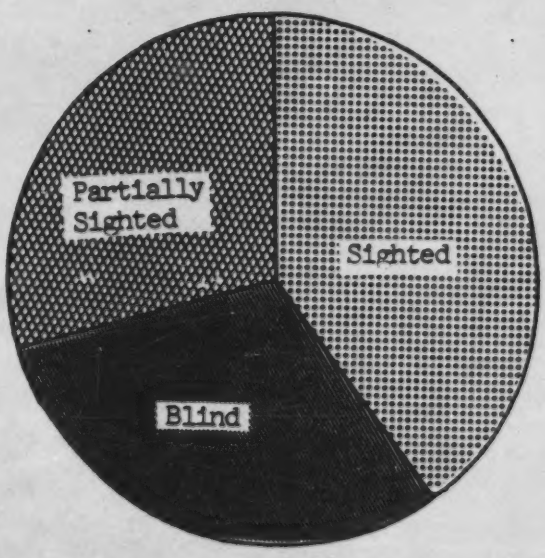
OPEN SPACE

17% Blind
35% Partially Sighted
48% Sighted



TRANSITIONAL SPACE

38% Blind
46% Partially Sighted
15% Sighted



EQUIPMENT

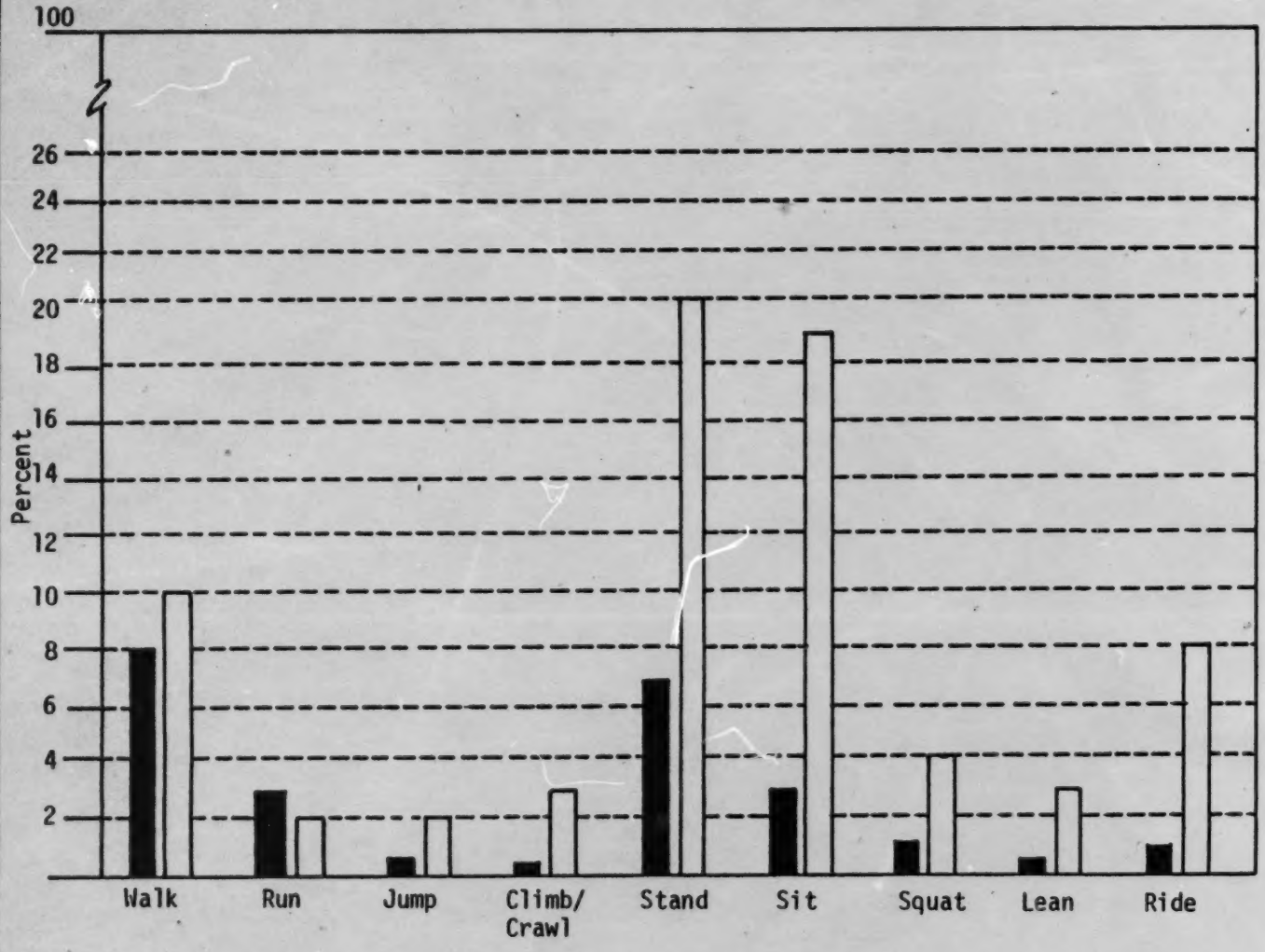
31% Blind
29% Partially Sighted
40% Sighted

Figure 9 LOCATION: USE OF SPACE

using it 17% of those observations. This is not difficult to understand because a blind child tends to stay close to objects for orientation. To be in the middle of an Open Space without objects usually results in disorientation and being "lost." The larger time spent in Transitional Space by the visually impaired may reflect the need to move slower from place to place.

To evaluate more carefully how the children were using the space we ran two additional analyses: Gross motor behaviors/location (N=36); and Relationship to equipment/sight.

GRASSY AREA (VSDB)



GROSS MOTOR BEHAVIORS/LOCATION

Figure 10

b. LOCATION - GROSS MOTOR BEHAVIORS/LOCATION

To establish which behaviors were occurring in what space, we ran frequencies of gross motor behaviors/ location for all groups. Those behaviors which occurred infrequently were dropped. The results below indicate with the exception of run, all behaviors occurred most frequently at equipment. (Figure 10)

Table 49

GROSS MOTOR BEHAVIOR/LOCATION

Frequency & Percent

	Open Space		Equipment		Transitional Space		Total	
	f	%	f	%	f	%	f	%
Walk	137	8	173	10	59	3	369	21
Run	60	3	33	2	14	.8	107	6
Jump	9	.5	30	2	4	.2	43	.2
Climb/ Crawl	7	.3	47	3	0	-	54	3
Stand	125	7	352	20	25	1	502	28
Sit	50	3	332	19	38	2	420	24
Squat	22	1	73	4	4	.2	99	6
Lean	5	.4	70	3	4	.2	79	4
Ride	16	.8	144	8	16	.8	176	10
	218		971		87		1769	

c. LOCATION - RELATIONSHIP TO EQUIPMENT

When the child was observed with a piece of equipment, the observer recorded the relationship of the child to it either as IN/ON or AT. It was assumed that a child immediately next to an object was still experiencing its presence and so equipment was recorded if the child were within 2 feet of an object. (Blakeley and Schneekloth 1974) Beyond the 2 foot sphere of influence, the location was recorded as hard surface, grass, sidewalk or stairs as appropriate. (Table 51)

Table 50

RELATIONSHIP TO EQUIPMENT

Frequency & Percentage

	Blind		Partially Blind		Sighted		Total	
	f	%	f	%	f	%	f	%
IN/ON	324	72	281	66	366	66	971	68
AT	128	28	146	34	190	34	464	32
	452		427		556		1435	

For all the groups (N = 36) the average time "in/on" a piece of equipment represented 2/3 of the time interacting with it; "at" the equipment was only 1/3. It is interesting to note that this is quite consistent across groups and apparently not sighted dependent.

d. LOCATION - GENERAL DISCUSSION

The results indicate that there are differences in the way the blind, partially sighted and sighted children use the space of the play environment. Nevertheless, there is a clear preference on the part of all groups for using equipment rather than either open space or transitional space, and for being on the equipment rather than next to it. The next section will discuss in detail the use of equipment by all groups.

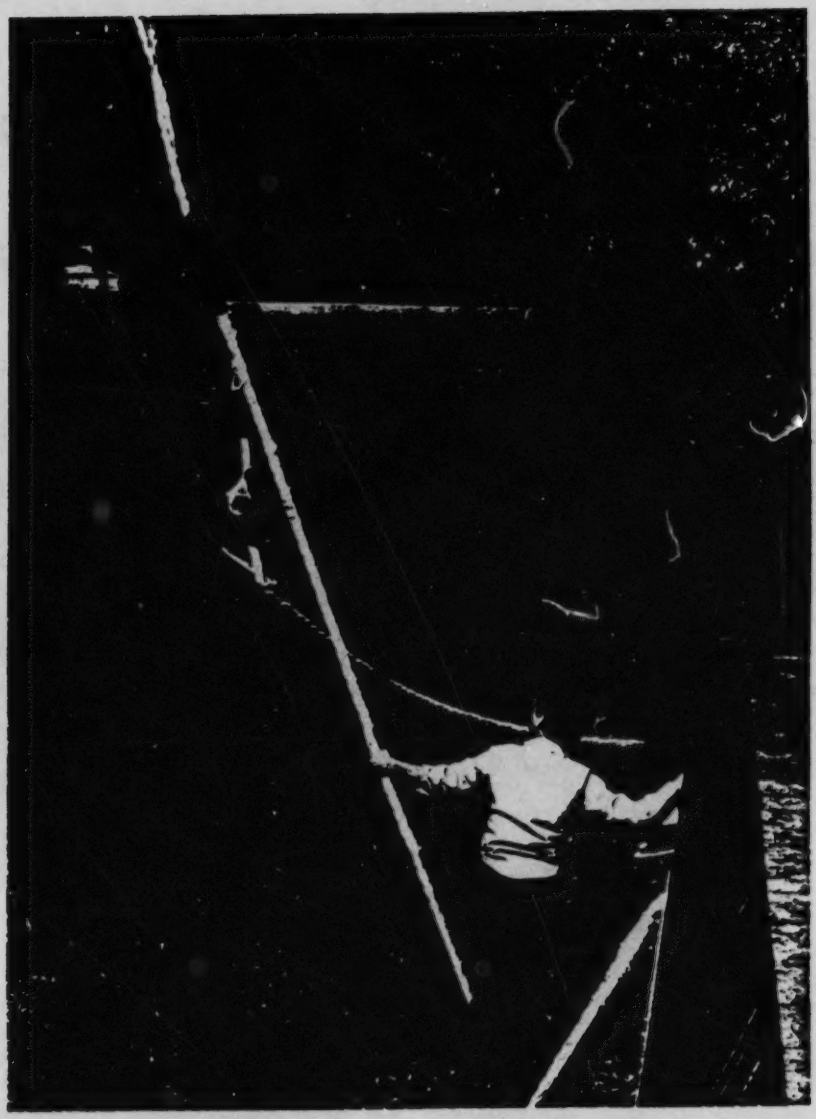
Table 51

GROSS MOTOR/EQUIPMENT

Frequency and Percentage

	Blind		Partially Sighted		Sighted	
	f	%	f	%	f	%
EQUIPMENT						
1. Merry-go-round	40	9%	25	6%	0	0
2. Slide	18	4%	18	4%	0	0
3. Swing	162	36%	74	17%	0	0
4. Tree Swing	3	1%	51	12%	41	7%
5. Sandbox	17	4%	24	6%	35	6%
6. Tree	2	0	1	0	180	32%
7. Fort	76	17%	74	17%	237	43%
		71%		62%		88%
LARGE MANIPULABLE OBJECTS						
8. Wheeled Toys	24	5%	23	6%	17	3%
9. Large Objects	0	0	0	0	27	5%
		5%		6%		8%
BOUNDARIES						
10. Rail	18	4%	42	10%	14	3%
11. Wall	92	20%	95	22%	5	1%
	452		427		556	

PARTIALLY SIGHTED CHILDREN AT EDGE



3. ENVIRONMENTAL COMPONENTS

The second category for environment was comprised of ENVIRONMENTAL COMPONENTS. There were three subgroups:

Equipment - The large objects on the playground which were used to play on, including large manipulables such as boards and tires.

Boundaries - Objects on the playground which are used to separate one area from another such as a retaining wall, a fence, etc., but which were often used as play objects.

Objects - Small manipulable objects such as toys, food, pieces of large equipment and natural materials, leaves, sand, etc.

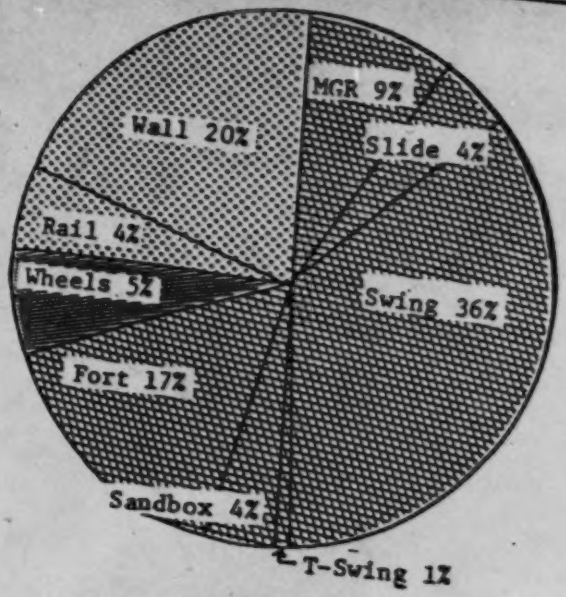
ANOVA resulted in significant differences in use of equipment and boundaries by sight and in use of equipment by age. There was no significant difference in the use of objects by sight or age.

These results support the earlier analysis on Manipulative Behaviors where there were no significant differences in behaviors across groups. All groups of children appear to be engaging in approximately the same kind of manipulative activities using the same amount of available environmental objects with the same frequencies.

a. COMPONENTS - EQUIPMENT & BOUNDARIES/SIGHT

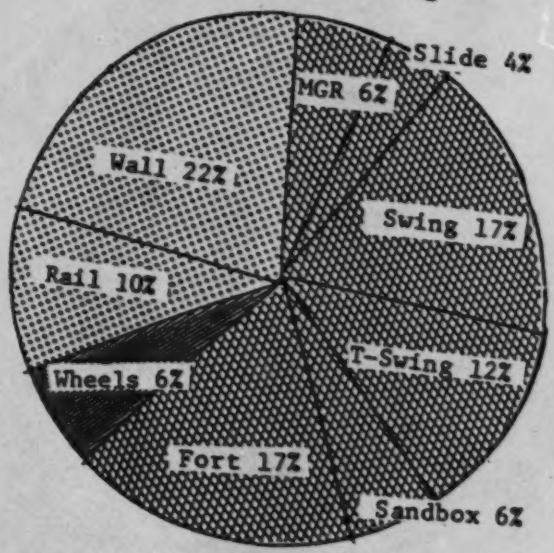
As was stated in an earlier discussion of the environment, the playgrounds at the Virginia School for the Deaf and Blind and the Blacksburg New School were not identical, although similar in quantity and complexity. For this reason the following will discuss the use of environmental components in a general rather than specific sense. (Table 52 and Figure 11)

One thing that stands out clearly is the difference in frequency of use of boundaries. The sighted children infrequently used them or organized their play around these space markers. The blind and partially sighted, however, used them often either as equipment or as orientation mechanisms. (Blind 24%, Partial 32%, Sighted 4%) The use of large manipulable objects for all groups is very similar suggesting that they are riding or pulling wheeled toys and moving other objects around with



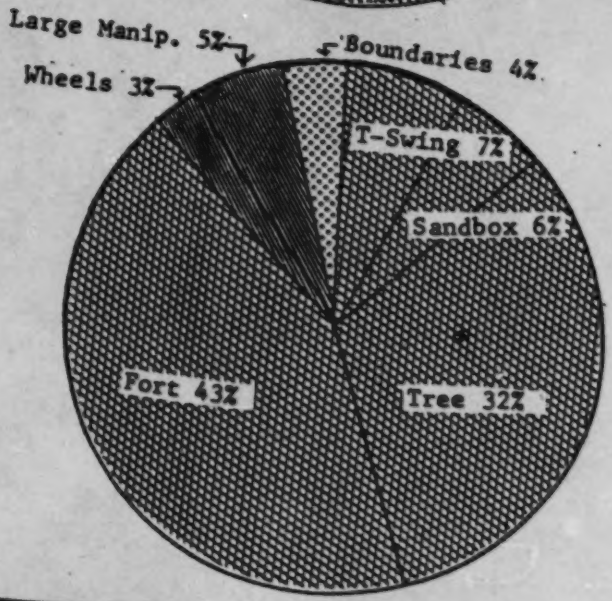
BLIND

71% Equipment
24% Boundaries
5% Large Manipulables



PARTIALLY SIGHTED

62% Equipment
32% Boundaries
6% Large Manipulables



SIGHTED

88% Equipment
4% Boundaries
8% Large Manipulables

Figure 11 EQUIPMENT USE/SIGHT

the same frequency. (Blind 5%, Partial 6%, Sighted 8%)

One result about equipment usage is a cause of concern for those interested in the healthy development of visually impaired children. The blind children used the traditional swing and merry-go-round as a primary activity (45%). The partially sighted also used these (23%) with frequency, but not as often as the blind. These objects are not interactive and do not encourage active exploration and movement by children. Rather, they are repetitive and further encourage the stereotypic rocking and swaying movements already occurring in blind populations. Often the children on these two pieces of equipment are not engaging in any active gross motor activities at all but are placed there, are pushed and then sit. Children were sometimes on these objects for 15-20 minutes with no other activity.

Activities such as swing can be accomplished on other objects. A tree swing forces a child to move himself and to use complex behaviors to receive the reward of swinging. Other devices such as a swing gate can give the sensation of vertigo and demands that the child move it through personal force.

The overall use of the environment by the groups showed that the large manipulables were used infrequently by all groups, but with approximately the same frequency. The equipment was used most frequently by all groups with sighted children using it the greatest percentage, 88%, the blind second with 71% and the partially sighted with 62%. The use of boundaries were markedly different with sighted children having the lowest percentage of 4%, the blind second with 24% and the partially sighted greatest users with 32%. Looking at the internal distribution of the use of boundaries by the partially sighted showed that they used the railing for 10% of their time. At the VSDB, the railing marked the periphery of the playground unlike the wall which was located in the center. They may have liked to use the edge of the area available to them, perhaps to demonstrate their relative independence as compared to the blind.

LARGE MANIPULABLE (VSDB)

b. COMPONENTS - EQUIPMENT/AGE

Significant differences resulted from an ANOVA of equipment use by age. Extreme caution must be used in interpreting these results because of the developmental lag seen in the visually handicapped children. However, it is interesting to note where the differences occurred between objects. (See Table 53)

Table 52

GROSS MOTOR BEHAVIOR/EQUIPMENT

Significant Chi Squares

		AGE				
		7.5 to 9.4	9.5 to 11.4	11.5 to 13.7	χ^2	P
1. Swing	f	30	126	80	29.92088	.0000
	%	1.6	6.6	4.2		
2. Tree Swing	f	12	56	27	8.87616	.0118
	%	.6	2.9	1.4		
3. Sandbox	f	45	23	8	47.17183	.0000
	%	2.4	1.2	.4		
4. Tree	f	60	120	3	54.22864	.0000
	%	3.1	6.3	.2		
5. Fort	f	162	169	56	72.05559	.0000
	%	8.5	8.9	2.9		
6. Wheels	f	7	44	13	10.09951	.0064
	%	.4	2.3	.7		
7. Rail	f	9	26	39	36.70735	.0000
	%	.5	1.4	2.0		

The middle age range, 9-1/2 to 11-1/2 years, used the equipment with the greatest frequency, the oldest group, 11-1/2 to 13-1/2 using it the least with the exception of the rail. This again may reflect the movement toward greater independence since the railing was the outside limits of the play area at VSDB. The youngest groups 7-1/2 to 9-1/2, used the sandbox the most and the fort almost as often as the middle age range.

Allowing for the developmental delay seen in two-thirds of this group, these figures support the environmental interaction theories purported by Piaget and others. The younger groups should be engaging in more environmental interaction than the older children, who should have moved out of their sensori-motor stage. But again, these comments are highly speculative without further analysis controlling for developmental age.

c. COMPONENTS - COMPLEXITY OF EQUIPMENT/COMPLEXITY OF GROSS MOTOR BEHAVIORS

An earlier analysis of gross motor behaviors resulted in significant differences between groups for complexity of gross motor behaviors. To further explore the implications of this measure of complexity, we compared the complexity level of gross motor behaviors to the level of complexity of equipment as measured by POCS to see if there was any relationship. (See Table 54 and Figure 12)

Sixty percent (60%) of all gross motor behaviors were Level 1, representing the least complex motor behaviors developmentally. Level II accounted for 30% of the total behaviors and Level III for 10%.

When analyzing percentage of equipment use by complexity, most of the gross motor behaviors occurred on the least complex equipment (Level I - 43%) and most complex (Level III - 40%) with only 17% occurring on Level II.

When comparing the Level of Gross Motor Behaviors and the Level of Equipment Complexity, the result that stands out most clearly is that the most complex motor behaviors occurred on the most complex equipment. The least complex motor behaviors occurred most often of the least complex equipment.

Table 53

COMPLEXITY OF GROSS MOTOR BEHAVIORS
By COMPLEXITY OF EQUIPMENT

Complexity of Gross Motor Behaviors

Complexity of Equipment as measured by POCS

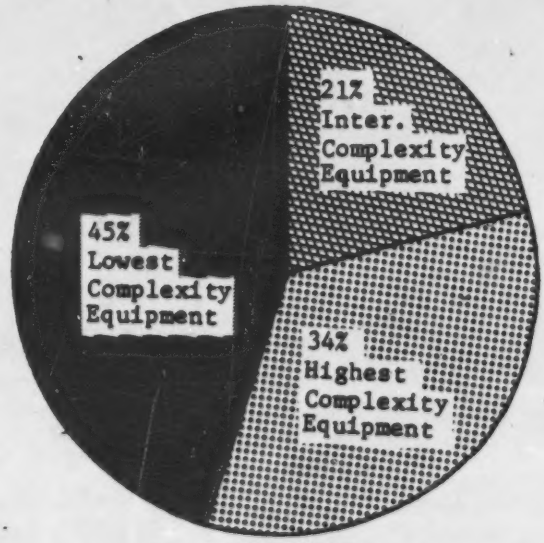
Direction of Complexity	Level I 60% Stand/sit/ lie/lean	Level II 30% Walk/squat/ scuttle/ ride/slide	Level III 10% run/loc/ jump/climb/ crawl/hang	
Level I rail wall slide sandbox swing 43%	408/47%	192/45%	14/10%	614
Level II merry-go-round free swing wheels large Manipulables 17%	142/16%	89/21%	20/15%	251
Level III trees fort 40%	318/37%	148/34%	104/75%	570
Total Behaviors	868	429	135	1435 100%

These results expand earlier work by Blakeley and Schneekloth which found there was a positive correlation between object complexity and preference (as measured by activity) by young children regardless of age or sex. ($R = .983$, $p = .000$) These data suggest that the most complex equipment elicit the most complex behaviors. Although further analysis needs to be done to establish a statistical relationship, these results have strong implications for playground design.

Figure 12

EQUIPMENT

LEVEL I GROSS MOTOR BEHAVIORS
Lowest Complexity: stand, sit, lie, lean



EQUIPMENT

LEVEL II GROSS MOTOR BEHAVIORS
Intermediate Complexity: walk, squat, scuttle, ride, slide

LEVEL III GROSS MOTOR BEHAVIORS
Most Complexity: run, jump, climb, crawl, hang, other locomotion

Figure 12 COMPLEXITY OF GROSS MOTOR BEHAVIORS/COMPLEXITY OF EQUIPMENT

d. COMPONENTS - GENERAL DISCUSSION

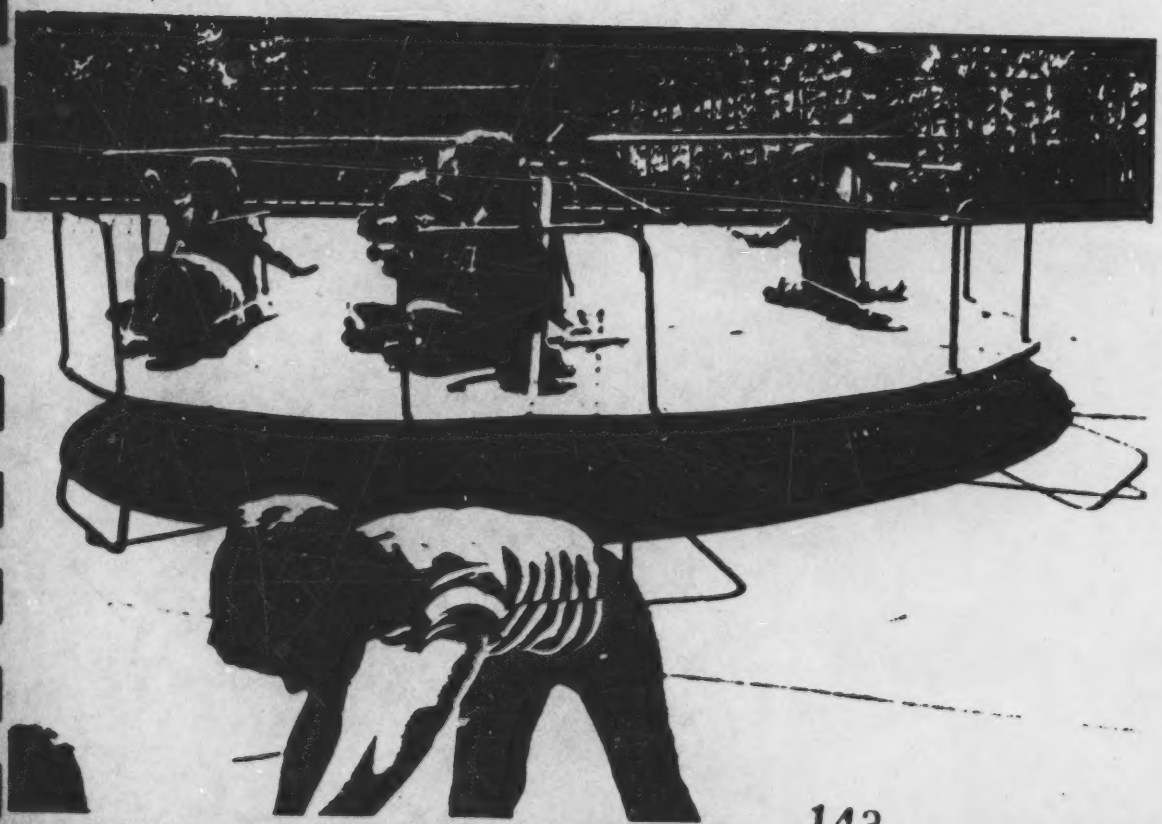
The results of ANOVAS for environmental components was significant at the .05 level. The use of equipment and boundaries by all the children suggest several design criteria for play environments.

First, there are some play objects which should be discouraged on a playground for the visually impaired - those objects which encourage repetitive, rocking movements such as swings and merry-go-rounds. Only equipment which elicit more complex patterns of motor activity should be used.

Secondly, the play environment should be comprised of complex equipment in order to stimulate the more complex behaviors which the visually impaired need to practice in order to improve their movement and orientation skills. The non-locomotive behaviors (Level I) can be accomplished as easily on more complex equipment, but the reverse is not true.

Third, boundaries appear to be very important for the visually impaired children. If there is a natural tendency to locate near a boundary, there is opportunity to make these boundaries complex components integrated into the play environment again to encourage more complex behaviors.

NON-INTERACTIVE NATURE OF MERRY-GO-ROUND



...AND SWING

VII. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

1. MOTOR PROFICIENCY
2. GROSS MOTOR BEHAVIORS
3. MANIPULATIVE BEHAVIORS
4. SELF-STIMULATION BEHAVIORS
5. SOCIAL AND PLAY BEHAVIORS
6. LOCATION
7. ENVIRONMENTAL COMPONENTS

B. SUMMARY DISCUSSION OF RESEARCH FINDINGS

C. METHODOLOGICAL CONCERNS

1. TESTING
2. OBSERVATION

D. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

1. MOTOR PROFICIENCY

The ANOVA for differences among groups for motor proficiency raw scores and age equivalent scores were significantly different at the .05 level with the blind and partially sighted children different from the sighted. The age average for blind was 5.11, for partially sighted, 5.75, and for sighted, 8.5.

2. GROSS MOTOR BEHAVIORS

The ANOVA for differences among groups for frequency, diversity and complexity of gross motor behaviors was significantly different at .05 level with the blind and partially sighted children alike, and different from the sighted children.

The relationship between frequency and diversity of gross motor behaviors and age equivalent score for motor proficiency was significantly different at .05 level. The sighted children exhibited a greater frequency, diversity and complexity of gross motor behaviors than the visually impaired children.

3. MANIPULATIVE BEHAVIORS

The ANOVA for differences among groups for frequency and diversity of manipulative behavior was not significantly different at .05 level. The correlation coefficient for relationship of frequency and diversity of manipulative behaviors to motor proficiency age equivalent was not significantly different at the .05 level. The motor proficiency score was not a predictor of frequency and diversity of manipulative behaviors. The blind, partially sighted and sighted children were similar in their manipulative behaviors.

4. SELF-STIMULATION BEHAVIORS

The ANOVA for self-stimulation behaviors was significantly different at the .05 level for fine and gross self-

stimulation with the sighted and partially sighted children different from the blind, but not different from each other. The chi square analysis on individual behaviors showed that the blind children were significantly higher on behaviors often referred to as stereotypic. The ANOVA for Contact with Self was significantly different among groups at .05 with the sighted having the highest frequency.

5. SOCIAL AND PLAY BEHAVIORS

The ANOVAs on behaviors in this category resulted in no significant differences in frequency of Physical Contact but was significantly different in Contact with Others (at .05 level). All groups appear to be in physical contact with others with the same frequency. However, the sighted exhibited significantly more social interaction and were most often interacting with peers while the visually impaired spend about 1/3 of their interaction time with adults.

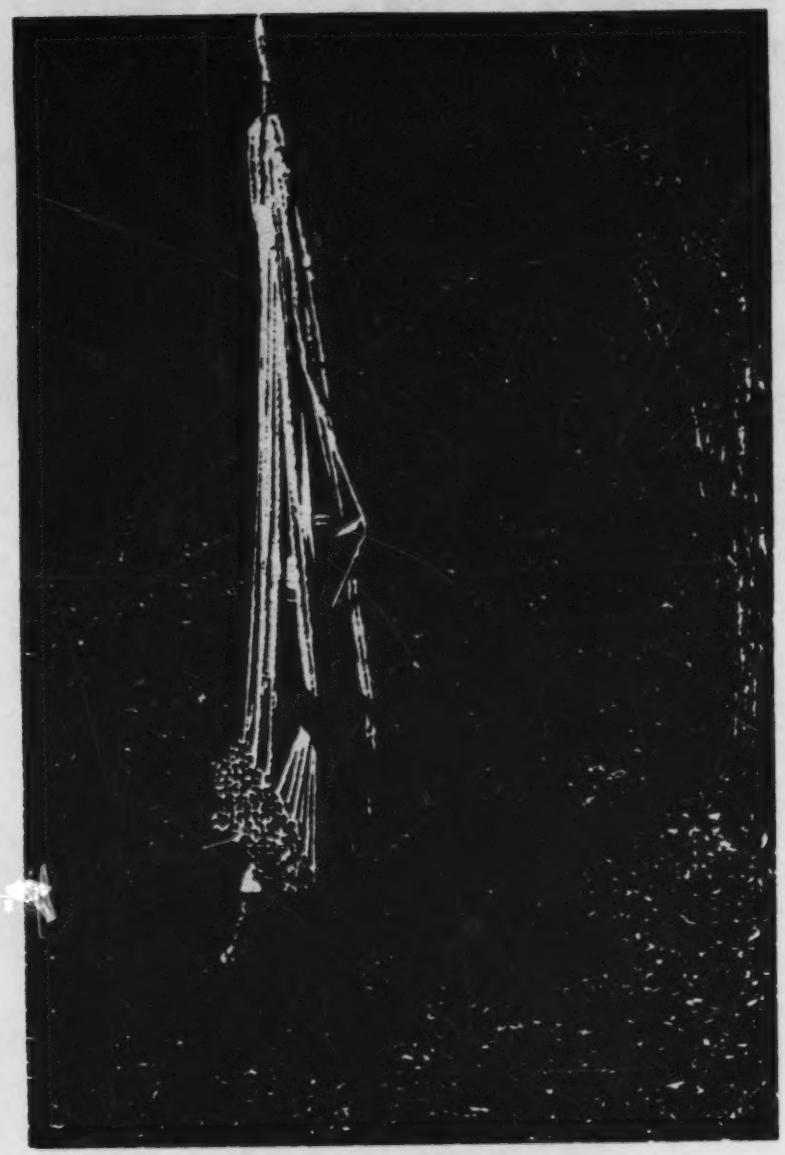
6. LOCATION

The location category was comprised of three kinds of spaces: open space, transitional space, and equipment. The ANOVA for location was significantly different at the .05 level with the visually impaired different from the sighted in use of open and transitional space; and all groups different from each other in use of equipment. When ANOVA was run for differences by age and sex, both were significant at the .05 level. There was a difference in the use of location by age, sight, and sex.

7. ENVIRONMENTAL COMPONENTS

The Environmental Components category consisted of equipment, boundaries and objects. The ANOVA for differences among groups for frequency and kind was significantly different at the .05 level for both equipment and boundaries for sight and for sight and age in use of equipment. The use of objects was not significantly different at .05 level supporting earlier data on manipulative behavior.

When comparing complexity of behavior to complexity of equipment, the results indicate that the most complex behaviors occur in the more complex equipment for all groups.



TREE SWING (VSDB)

B. SUMMARY DISCUSSION OF RESEARCH FINDINGS

The results of the motor proficiency test indicate that the visually impaired children are capable of all the motor activities exhibited by the sighted children on the playground. The question becomes one of "Why don't they exhibit the same frequency, diversity and complexity of gross motor behaviors?" rather than "Are they capable of it?" Further, there were no significant differences in the frequency and diversity of manipulative behaviors among the blind, partially sighted and sighted children. These data suggest to us that the missing component is experience rather than ability. The visually impaired children have not been provided with adequate environments nor encouragement to practice the gross motor skills so necessary for eventual independence.

The data on self-stimulation raised more issues than it resolved but nevertheless pointed out some new directions. The significant differences in self-stimulation behaviors occurred with the sighted children exhibiting the most self-stimulation. This was not anticipated and raised questions about the "normalcy" of such behaviors. If all children engage in self-stimulation, perhaps the behaviors of the blind children are not as unusual as would initially appear. However, when the category of self-stimulation was subdivided into traditional stereotypic (rocking, eyepoking, handshaking, etc.) and non-stereotypic, the blind children clearly exhibited the greatest frequency of the stereotypic behaviors. Our observations suggest that the differences rest in the kind, randomness and duration of self-stimulation behaviors, not in the act of auto-manipulation itself. Clearly this issue warrants more research because of the stigmatization which results from stereotypic behaviors by the blind.

A significant difference appeared between the blind and sighted children in the amount of time spent in social/play contact. The visually impaired children spent 41-49% of their play time alone compared to 14% by the sighted. This phenomena may be a result of a lack of ego differentiation by the visually impaired children which Fraiberg so cogently discussed in Insights from the Blind. Until the blind child can constitute an "I" and a "you," the kind of cooperative play seen in the sighted children becomes an impossibility.

The lure to parallel play apparent in young sighted children is not present for the blind child who cannot observe and play next to another child. And yet, from developmental level and activities observed in these children, parallel play is the kind of play that would be seen in an age equivalent group of sighted children.

The delay in developing representational intelligence which would lead the child into the organization of an object world, impedes the development of social contacts and play. However, Fraiberg reports that "in those areas of development where comparative data are available, our educationally advantaged blind infants came closer to sighted-child ranges than blind-child ranges." Interventions programs have made differences in supporting the development of blind children. The more experiences of the world of objects that are available to the visually impaired child, the more opportunities for development of representational intelligence.

Attention to the environmental interactions of the three groups of children has lead to some interesting comparisons of sameness and differences. The visually impaired children used the space differently (significant at .05 level) from the sighted children, using the boundaries more and open space less. However, all the children exhibited a preference for equipment and used objects in the environment as organizers for activities.

The children were not randomly distributed throughout the available space but clustered around objects with a preference to be "on" rather than "at" them. Further, for all groups the most complex behaviors occurred on the most complex equipment.

These results offer several design guidelines for play environments for the visually impaired. If the children have a preference for boundaries there is an opportunity to integrate them into the playground to form a part of the play equipment. Moreover, to further encourage the visually impaired children to exhibit more developmentally complex behaviors such as climb, crawl, run, hang, etc., provide more complex equipment, which could include increasing the complexity of boundary conditions.

USE OF BOUNDARIES (VSDB)

C. METHODOLOGICALLY CONCERNS

1. TESTING

Motor proficiency measuring techniques for special populations, including children with visual impairments, have not been developed. One confounding variable is the wide range of abilities within the same handicap which makes the establishment of norms quite complex.

Perhaps tests with norms administered in the laboratory setting may not be appropriate for special populations. As Fraiberg's work has demonstrated, motor development information can be obtained through careful observation in the natural setting with selective intervention to encourage the child to perform certain behaviors (1977). Halverson (1971) would argue that to ask a child to jump high may not be an appropriate way to obtain a quality movement response. Rather, ask the child to reach for a ball suspended above him and most often the movement response would be more reflective of the child's true capability.

The Individualized Educational Program (IEP) is an indicator of the special attention that each child in special education is currently receiving. His/her abilities are assessed on an individual level in a program developed on an individual basis. Rather than focusing on the development of norms for a given handicap, the concept of testing might do better to focus on creating the conditions wherein each child can demonstrate his/her capabilities. If the question is less, "How does this child compare to others?" but "What are the abilities of this child?" an individual focus without strict controls may be appropriate.

2. OBSERVATION

Observational methodology appears to be the tool most applicable to investigations into person-environment interactions. It addresses the question being posed in the research, i.e., what is the nature of the interaction between an individual or groups of individuals, and their ongoing, intact environment.

Experimental data are limited in the information available for interpretation because of the impossibility of

creating in the laboratory or testing situation the "frequency, duration, scope, complexity and magnitude of some important human conditions." (Barker 1968, p. 3) Because research on the interaction of behavior and environment strives to examine the "ecology" of the situation, it cannot remove itself from the real world and maintain the external validity it seeks.

However, the naturalistic observation methodology imposed limitations on the amount of control we were able to exert over conditions such as schedule (sick children, other activites); environment (the children were each at their own schools and as such not in the same environment) and weather. Further limitations were imposed because of the time sampling techniques. Without continuous observations we were not able to get durations of activities (such as self-stimulation behaviors) or to understand the antecedents to behaviors (such as the probable differences in the behavior "stand" or the question of who initiated activities with adults or peers). The measure selected, anatomically describable behaviors, allowed us to take reliable and valid data. It did not, however, allow us to take data on content of play. The distance maintained from the children in order to be as unobtrusive as possible did not permit careful exploration of subtleties in movement of hands and feet that may have given us clues to orientation in the blind. Some form of video or film would greatly enhance research in this area.

The data we were able to record and analyze is nevertheless accurate, reliable, and a valid representation of the children's behavior in their intact play environment. The research accomplished our initial objectives to more fully understanding the differences in motor behavior, play activities and environmental interactions, of sighted and visually impaired children.

D. CONCLUSIONS AND RECOMMENDATIONS

Our data supports earlier research that suggests that visually impaired children are developmentally delayed. More specifically, we found the delays in gross motor and social/play behaviors. Delays are not evident in manipulative behavior, behaviors which can be practiced independently of adult supervision and in any environment. Our motor proficiency testing established that the visually impaired children are capable of the same motor behaviors that the sighted children exhibited. These findings lead us to suggest that the delay results from lack of experience and is not an inherent part of the sensory impairment.

We began with an initial assumption that visually impaired children have a right to play and recreational experiences. The question posed in the research was how such experience can be provided. Based on the research, we recommend that intervention programs be established for children with visual impairment which have two foci. First, there is a need for appropriately designed environments which are accessible, safe, exciting and complex. Secondly, there should be training programs established for service providers which facilitate the development of environmental competence, i.e., the use of the environment as an active tool in achieving the educational objectives for each child. Such "environmental intervention" strategies should facilitate healthy development and eventual independence by visually impaired children.

APPENDICES

		Page
Notes		165
Bibliography		169
Appendix A	Review of the Literature	175
Appendix B	Methods Supplement	189
B-1	Map of Virginia School for the Deaf and Blind, Staunton, Virginia	191
B-2	Completed Checklist	193
B-3	Record of Observations per Child	195
Appendix C	Definitions	197
Appendix D	Motor Proficiency Items	207
Appendix E	Equipment	219
E-1	Play Object Complexity Scale (POCS)	221
E-2	Rating of Project Equipment by POCS	225
Appendix F	Vitae	227

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APPENDIX A
REVIEW OF THE LITERATURE

A. VALUE OF PLAY

B. PLAY BEHAVIOR OF THE VISUALLY IMPAIRED CHILD

1. The Blind Child
2. The Partially Sighted Child

C. MOTOR DEVELOPMENT OF THE VISUALLY IMPAIRED

1. Early Motor Development
2. Later Motor and Locomotor Development

APPENDIX A
REVIEW OF LITERATURE

A. VALUE OF PLAY

Growth and learning for a child is an active process. It is derived through interactions with the world, both objects and people, from which understandings of the world develop. Piaget (1962) argues that much of what we call play is actually the development of intelligence. Piaget's emphasis on environmental interactions is emphatic and clear, although the research to date has made little comment about the characteristics of the environment that might be best suited for the child's experience of manipulation. Brian Sutton-Smith has expanded on the work of Piaget to theorize that play is not solely a cognitive function. He suggested that play and exploration behaviors promote learning in all domains, cognitive, effective and sensori-motor.

Erikson (1950) expanded on the psycho-analytical theory of play proposed by Freud by emphasizing the value of play for healthy development. Earlier psychoanalytical theorists considered play as having only cathartic value. Erikson proposed that child's play is the way a human deals with experience by creating model situations for mastery of reality by experimentation and planning.

Other researchers suggest that playful interactions with the environment are prerequisite for skill development in sensori-motor capacities, for mastery of locomotion and fine motor skills, and for refinement of kinesthetic and propioceptive senses. (Espanschade 1967,

Seidentop 1972) Jerome Bruner (1975) emphasizes in his research the non-stressful characteristic of playful situations which allows for non-pressured interactions; interactions where routines in all developmental domains can be practiced without consideration of the consequences.

Leading child development theorists describe the importance of play for normal healthy development. Initially play was identified as purposeful for experimentation and planning, while later theories emphasized the cognitive benefits of play. Current positions favor play in promoting learning in all domains: cognitive, affective and sensori-motor.

Most importantly, plan seems to be the activity that children do most of the time without regard for where they happen to be. White (1961) has suggested that such a drive toward successful interactions with the world is instinctual. Play appears to be an all-encompassing phenomenon which describes a necessary activity of young humans. Limitations of play experiences, either because of a handicapping condition or interference from others, have grave consequences for healthy growth and eventual independent living.

B. PLAY BEHAVIOR OF THE VISUALLY IMPAIRED

Literature on the play behavior of the visually handicapped is not extensive. The data that do exist on the play of blind children, although limited, were collected from observational reports and case histories. Most of this research indicated that blind children play less than sighted children and that play behaviors which are exhibited tend to be poor in quality (Rothchild 1960; Burlingham 1961, 1965; Singer and Streiner 1966; Cowan 1972; Wills 1968; Tait 1972b). Little empirical research has been completed which compares the play patterns of blind and sighted children.

1. The Blind Child

Rothchild (1960) reported in his work that the blind child may not be accustomed to express and involve her/himself in play. He felt that the attitude toward play in the blind child's life was considerably less important to him/her and therefore was less frequently

pursued than for the seeing child. Rothchild's observations indicated that the blind child had little interest in toys and inanimate objects, tended toward motor inactivity and appeared to be content to be left alone. Tait (1972d) suggested that "the blind child must actually be taught to engage actively, creatively and independently in spontaneous play activities" (p. 368).

Wills' (1968) writings were based on longitudinal observations of blind children who attended a day nursery school. In her work, Wills observed that blind children stopped playing at an age-adequate level and withdrew into simple primitive, repetitive activities unless an adult constantly stimulated and supported their interests. Wills suggested two possible reasons for the development of these abnormal play patterns. First, blind children are stimulated more by people than by objects and second, blind children tend to withdraw because of anxiety and fear. Thus, Wills contended that the field of the blind child's play was narrowed. She felt that personification of inanimate objects, which is very important in fantasy play, did not occur because of the anxiety objects provoke.

On the other hand Avery (1968) did not agree with the findings of Wills. She felt little difference exists in the play patterns of the blind child and those of seeing children. She also noted in her play therapy sessions that the blind children were able to manipulate play materials for a variety of original uses.

In a study by Singer and Streiner (1966) twenty blind children were compared with twenty sighted children in a series of interviews, spontaneous accounts of their play, fantasies and dreams. The ages of the children were eight to twelve years. The purpose of the study was to test the imaginative content of the fantasy in play of the blind and sighted children. Results indicated that sighted children were more imaginative while blind children generally displayed a concrete and limited fantasy content except in the area of greater reliance on imaginary companions.

Tait (1972b) also compared the play of blind and sighted children and these results differed with those of Singer and Streiner. Play behaviors of twenty-nine blind and seeing children ages four through nine years were observed in a controlled play situation. The play sessions were tape recorded and brief notations were made at the completion of the play period by the observer.

The tape recordings and notations made up a narrative record which was then studied. The children came into a portable enclosure placed within a classroom. Once inside play materials and equipment were introduced to the children who explored them during a fifteen minute unstructured play period. The play behaviors were divided into three areas: manipulative, dramatic, and other (defined as any behaviors other than dramatic or manipulative). No difference was found in the total time spent in dramatic play for the blind and sighted subjects. However, blind children engaged in manipulative play more frequently than did the sighted children. This difference, according to Tait, may be attributed to (1) the tactile pleasure the blind children received from handling the play materials, (2) blind children may have needed to examine more closely the objects which a sighted child may have been familiar with, or (3) the blind child may have used the manipulative play as a device to continue the contact with the adult investigator. It should be noted that Tait's study recorded only the presence of dramatic play. No qualitative assessments of the contents of the play was attempted in the Singer and Streiner study.

The review of play behavior literature generally indicated that differences exist in the play of the blind when compared to that of sighted peers. However, some disagreement was found as to exactly how or why these differences were manifested. With one exception all children were observed in artificial settings. Varied measuring techniques and components of play were analyzed. Moreover, research on the play of the blind child was limited because it did not deal with subjects in their natural play settings and few studies have been verified by replication.

2. The Partially Sighted Child

Little research exists on the role that residual vision plays in mobility and play behavior. The research that has been done seems to indicate that there are both positive and negative effects of residual vision.

Although the term residual vision is frequently used when referring to visual disabilities it can refer to two quite different types of visual loss. The first is the ability to perceive degrees of diffused brightness or minimal light perception. The second use of the term residual vision is for a selective dysfunction of part or parts of the visual system. Examples of two selective dysfunctions would be peripheral loss or muscular

loss (spotty vision). As would be expected the specific visual dysfunction would affect mobility quite differently.

Only recently have professionals working with visually handicapped begun to recognize the problems of the partially seeing in mobility. Silver (1964) was one of the first to recognize the importance of making distinctions in visual dysfunctions as they affect mobility. He studied the various visual dysfunctions and discussed how each of these may affect mobility training.

"There is little question that the person with some residual vision of whatever type, is at least potentially better off than the person with none. Residual vision allows the intake of information about the world that is lacking in the totally blind." (Warren and Kocon 1974)

In their book, Adjustment to Blindness -- Reviewed, Bauman and Yoder (1966) state that even a small amount of remaining vision greatly facilitated freedom of travel. Lord (1969) who developed scales for measurement of orientation and mobility of young blind children found that children who possessed light perception showed superiority in those items which required locomotion. Specifically the items which showed significance were: points toes in direction of travel, walks with relaxed gait, walks up and down steps alternating feet, turns and faces opposite directions, gallops and runs freely by himself. The blind subjects showed significance on the following items: travels routes using cardinal directions, demonstrates parts of door and can use a door key.

Attitude is an important dimension involved in the mobility of the partially sighted. Residual vision can be quite sufficient for some aspects of mobility such as avoiding structures or large objects. Tasks where good acuity is required such as reading street signs or bus numbers the person with residual vision will need help. Hughes (1967) points out that the partially sighted are afraid of being branded as a fake because they appear as seeing individuals, yet they need help in distinguishing small print on street signs. He also states that "the sighted public is more favorably disposed to help a partially sighted student cross a four-lane intersection or read a street sign or bus number when they observe that the soliciting individual is carrying a cane." (1967, p. 120)

Discussions with teachers of the partially seeing have revealed that many children who have vision in only a small quadrant of the eye may need to tilt or hold their heads in an unusual manner and often do not look directly at the person to whom they are speaking. This behavior is often seen as socially deviant by peers and may result in the child not using his available vision. What possible advantage he may have with even a small amount of vision may be completely lost. Bauman (1966) looked at the personality differences between partially sighted and totally blind adolescents and adults. He found that partially sighted showed less adequate adjustment to visual loss and a greater incidence of tension and pressure.

In the past it was thought that to use residual vision would cause it to deteriorate. The notion, however, appears to be groundless. Warren and Kocon (1974) point out that even if residual vision did deteriorate with use, if the person does not use it while it remains, then it would be of no use to him anyway. Barraga (1964) found in her work with partially seeing schildren that the use of residual vision did not lead to its faster deterioration and may in fact have led to its improvement.

Only recently have educators working with visually impaired children made an attempt to make special provisions for them. The one time prevailing attitudes and practices that the child with low vision had to be treated and trained as a blind child is disappearing. The impetus has clearly come from the eye specialists who have encouraged the use of what vision there is while it remains.

Residual vision is potentially an important aid for effective mobility. Only with further research will the specific role it plays in mobility become clear.

C. Motor Development of the Visually Impaired

The literature on the early motor development of the blind child seemed to agree that movements during the first few months of life are not different from those of the sighted child. However, Fraiberg (1977) believes that after the first few months the healthy blind child develops unique patterns for gross motor development

which are normal for this population but differ from the sighted child.

1. Early motor development. Norris, Spaulding and Brodie (1957) presented information about performance of blind infants on the Cattell Infant Intelligence Scale. This test measured motor development related to manual manipulations. Differences between the blind and sighted appeared in "unilateral reaching" and "persistent reaching." The blind children showed a lag several months behind the sighted children. Items involving fine motor control, such as "scissors grasp," showed delays. Norris et al. stated that lags for the blind children appeared to be in areas where the infants had little experience. Blind children who had been encouraged to explore the environment showed fewer deficiencies.

Adelson and Fraiberg's (1974) study was a thorough examination of the development of gross motor abilities of blind children. Fraiberg compared blind infants' test results to norms for sighted children on items that involved primarily postural skills; the items which showed deficiencies involved mobility skills that normally followed each postural attainment. Fraiberg's (1968) findings, unlike those of Norris et al., reported that the development of the scissors grasp was similar to that of sighted infants. She did, however, note that delays occur with respect to the coordination of two hands. The blind infant failed to bring the hands together at the midline which resulted in the inability to use two hands to explore and manipulate tactually. Fraiberg also reports a delay in the onset of crawling and walking. Her hypothesis was that the onset of self-initiated mobility was related to the demonstration of each child's ability to reach out and attain an object presented by sound cue alone. This recognition of the importance of prehension provided the first clues to the developmental delay of mobility of the blind child. "A blind child does not reach for and attain a sound object until the last quarter of the first year, and proficiency in 'reach on sound' may not be atained until the next quarter. When sound provides the lure for reach, the blind child begins mobility." (Adelson and Fraiberg 1974, p. 114) Fraiberg (1977) also calls attention to the little known fact that the sighted infant, as well as the blind child, does not reach for what she/he hears but cannot see until late in the first year of life.

2. Later motor and locomotor development. Buell (1950) tested blind children in motor performance areas related to physical education and found lags when compared to sighted children. He attributed these deficits to insufficient motor activity primarily caused by parental overprotection.

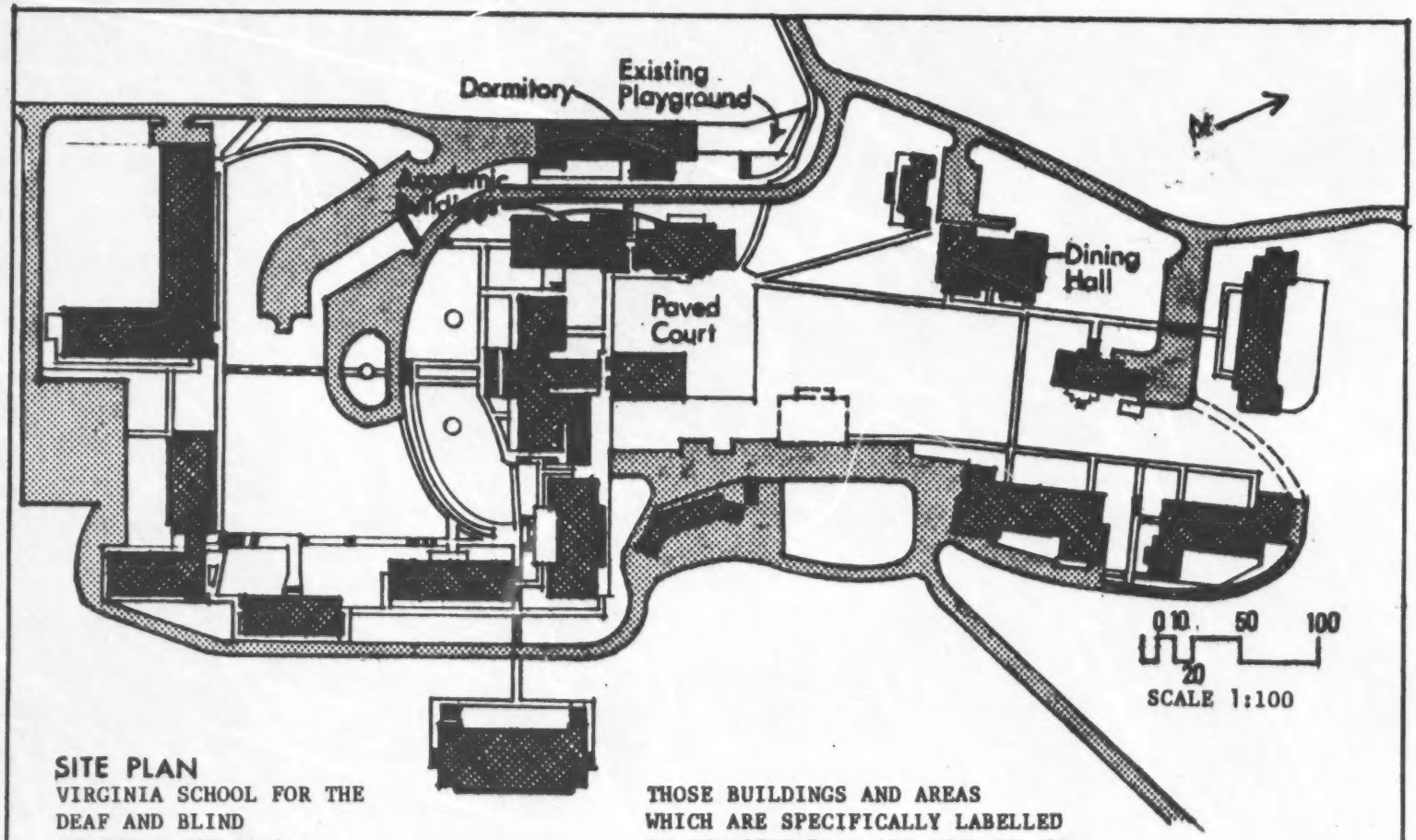
Burlingham (1965) saw the motor lag between sighted and blind children not as a result of lack of motivation for movement but as a condition of the child's own inhibitions. When the child feels conditions are safe she/he will engage in normal motor activity. This hypothesis on the part of Burlingham would seem to in part agree with that of Buell (1965). The importance of the role that the parent plays in encouraging the child to move and explore the environment may be a critical factor in successful motor development.

Good posture and balance were noted as necessary for successful mobility skills of the visually handicapped in a study by Turner and Seigel (1969). Effective mobility is greatly dependent on locomotion and locomotion is highly related to good posture. Posture plays an important role in keeping the body in a vertical relationship with the environment. Turner and Siegel developed an evaluation form for the assessment of physical skills related to good posture. In addition they provided therapy procedures for the correction of difficulties.

Lord's (1969) work was much more extensive than that of Siegel and Turner. His project was intended "to define or identify the behavioral components in orientation and mobility which are relevant for young blind children and to develop scales for the measurements relating the implied performances" (p. 77). The first edition of the scales consisted of 288 items. Lord worked with a jury of child development specialists, orientation and mobility specialists and experienced teachers of the blind who ranked the importance of the items as well as positioning them within a developmental sequence. The second edition of the scales was administered to a representative sample of blind children and further revised. Examples of the items in the developmental scale are: Directions, turns - responds correctly to a command to turn, correctly describes a familiar routine in terms of right and left turns; Movement in Space - walks with weight properly distributed, walks with relaxed gait, walks up steps alternating forward foot, one foot per tread, etc. The scales developed by Lord can be used not only to determine if the child has the

appropriate skill needed for formal orientation and mobility training, but more importantly they are a diagnostic tool.

Literature reviewed showed that selective lags are found in motor development for the visually handicapped child. Prime areas were those that involve orientation to the external environment such as reaching, crawling and walking. Warren (1977) called for normative data in the development of infants, especially in conjunction with corresponding environmental data. The literature did seem to indicate that motor development was somewhat dependent on experience, although authors did not always agree. "Adequate attention to aspects of the physical and social environment, as well as to the developmental progress of individual infants, should produce a better understanding of the characteristics of the motor and locomotor development of blind infants and of the environmental conditions that are conducive to normal or abnormal development." (Warren 1977, p. 63)



SITE PLAN
VIRGINIA SCHOOL FOR THE DEAF AND BLIND
STAUNTON, VIRGINIA

THOSE BUILDINGS AND AREAS WHICH ARE SPECIFICALLY LABELLED ON THE SITE PLAN ARE USED BY THE BLIND DEPARTMENT.

APPENDIX B-2

COMPLETED

OBSERVATION CHECKLIST

CHILD # 104 DATE 10/4/79 OBSERVATION # 5,1 TIME 3:32

SCHOOL VSDB OBSERVERS DD/LS LOCATION Playground

GROSS MOTOR ACTIVITY

	X		Rel.	Environment	
Environmental					
walk		20			97
run		21			98
loc on feet		22			99
jump		23			
					100
stand		24			101
sit	✓	25	On	Slide	102
lie		26			103
squat/kneel/bend		27			104
lean		28			105
					106
climb	✓	29	On	Slide	107
crawl		30			108
ride		31			109
hang		32			110
slide		33			111
fall		34			112
scuttle		35			113
other					114
Self					115
body rock/sway		36			116
jump		37			117
bounce		38			118
head shake		39			119
chest beat		40			120
handshake/clap		41			121
					122
Other		42			123
					124

MANIPULATIVE ACTIVITY

	X		Environment	
Environmental				
finger/explore		43		125
touch		44		126
hold		45		127
grasps	✓	46	Slide	128
put/drop		47		129
open/twist		48		
eat/drink		49		
kick		50		
throw		51		
strike/dig		52		
rock		53		
push/pull	✓	54	Self	
carry		55		
lift		56		
other				
reach out		57		
at rest		58		
Self				
face rub		59		130
eye poke/rub		60		131
mouth		61		132
touch (once)		62		133
finger/rub		63		134
hold		64		135
scratch		65		136
				137
		66		138
				139
Other		67		

SOCIAL AND PLAY BEHAVIORS

	X		P	A	
Physical					
touch		68			140
hold	✓	69		✓	141
pat		70			142
give/take		71			143
					144
push/pull		72			145
hit		73			146
kick		74			147
grab/pinch		75			148
rough/tumble play		76			149
Vocalizations					150
sing		77			151
laugh		78			152
talk/listen	✓	79		✓	153
self-vocalization					154
Focus					155
listen/watch		80			156
long distance		81			157
					158
Cooperative Play					159
quiet		82			160
active		83			
Alone		84			
Other		85			
LOCATION					
Hard/Flat		90			
Sidewalk/Trans.		91			
Grass		92			
Stairs/Steps		93			
Equipment		94	✓		
Room		95			
Transition Space		96			

193

BEH Schneekloth/Day
1979-80

RECORD OF OBSERVATIONS/CHILD

Child	OBSERVATIONS #1	#2	#3	#4	#5	#6		MAKE-UP OBSERVATIONS #7	#8	#9	#10	TOTAL
Dates	9/20	9/26	9/28	10/2	10/4	10/9		10/18	10/22	10/25	10/29	
Blind												
100	0	5	5	5	0	8		7				30
101	5	5	3	6	6	5						30
102	5	4	5	5	5	6						30
103	0	5	0	5	0	10		8	2			30
104	3	4	5	5	6	3		2				30
105	5	5	0	7	3	4		4				28
106	1	6	3	7	7	6						30
107	0	5	6	7	6	6		1				31
108	5	5	0	8	6	6						30
109	4	5	0	2	8	2		8	1			30
110	0	1	3	5	2	5		5	5	5		31
111	5	1	5	7	8	6		1				33
Partially Sighted												
200	0	5	3	8	6	8						30
201	5	5	0	6	8	6						30
202	0	0	6	6	0	7			6	5		30
203	5	5	5	4	5	6						30
204	0	6	0	0	0	8			8	8		30
205	5	5	5	5	5	5						30
206	0	0	7	5	0	9		4		5		30
207	0	5	6	6	0	7		4				30
208	0	5	4	2	7	0		7		2	3	30
209	5	5	5	0	0	8		7				30
210	5	5	6	5	1	0		8				30
211	5	5	0	8	6	0		5				29
Sighted												
Dates	9/19	9/25	9/27	10/3	10/5	10/16		10/19				
300	5	5	5	5	5	5						30
301	0	7	6	6	6	0		5				30
302	5	5	5	8	5	0						34
303	5	5	5	5	5	5						30
304	5	5	5	7	8	5						35
305	5	5	0	8	8	5						31
306	5	5	1	8	6	7						32
307	0	4	4	6	0	7		7				30
308	5	5	0	7	6	0		7				30
309	5	5	0	8	6	0		7				31
310	5	5	5	5	5	5						30
311	3	5	5	5	5	5						28

199

DEFINITIONS OF BEHAVIORS

I. GROSS MOTOR

1. WALK - Movement transferring the body weight forward through space from one foot to another. The heel of the forward foot touches ground before the toe of the opposite foot pushes off and the arms and legs move synchronously in opposition. (Wickstrom, 1970)

2. RUN - Exaggerated form and extension of walking with addition of flight phase during which the body weight is propelled through space without support of either leg. (Wickstrom, 1970)

3. OTHER LOCOMOTOR ON FEET (Term used for purposes of checklist to group skip, gallop, leap and hop into one category)

   a. SKIP - Transfer of weight involving a combination of walking and hopping. Child steps forth on one foot and hops upon it, then steps forth on the opposite foot and hops upon it. (Schurr, 1975)

   b. GALLOP - Transfer of weight using combination of a step and a leap. In the gallop, one foot leads throughout; the other foot is rapidly brought up to it, and the lead foot again extends. (McClenaghan and Gallahur, 1978)

   c. LEAP - "The leap is much the same as the run; however in a leap the ankle and knee actions are increased so that a more upward motion is achieved. The knee leads out and then stretches forward as the foot reaches out for the landing. The rear leg extends backward in the air after vigorous push-off from the ground. The period of suspension in the air is greater than in the run. The arms move upward to sustain the body in the air. The take-off is from one foot and the landing is on the other foot." (Schurr, 1975, p. 243)

   d. HOP - A transfer of weight in which the child pushes body off floor from one foot and returns to floor upon the same foot in the same place or while moving the body through space. (Schurr, 1975)

4. JUMP - "A jump is a motion that carried the body through the air from a take-off of one or both feet. The body is suspended in mid-air momentarily and then drops to the ground to a landing where the weight is taken on both feet." (Schurr, 1975, p. 244)

5. STAND - The body is in stationary upright position, weight on feet. (Schneekloth and Burke, 1978)

6. SIT - "The trunk is lowered by hip and knee flexion; the result is that the body rests primarily on the buttocks. While seated the legs may be extended horizontally, partially flexed with only the feet on the ground, or dangled below. The neck is fully extended with the head upright." (McGrew, 1972a, p. 93)

7. LIE - A sideways reclining posture with the main body axis horizontal to the ground (from a standing position). Prone reclining posture with full weight on trunk. Knees may be flexed or extended. (Schneekloth and Burke, 1978)

8. SQUAT (CROUCH)/KNEEL/BEND

   a. SQUAT - "The knees are flexed so that the trunk and head are lowered (while standing) and/or the back is flexed with the same result (while sitting). In extreme crouching the chest and upper legs are brought together, so that the head is close to the knees. The arms may be flexed over and around the head and neck. The neck may be flexed so that the face is horizontal and down." (McGrew, 1972a, p. 88)

   b. BEND - Body is flexed at the hips at approximately a 90^{0} angle -- appears to be going into a squat and often does.

   c. KNEEL - "The trunk is lowered and tilted forward by hip and knee flexion; the result is that the body rests on the knee (one or both) and feet (both). After assuming the posture the trunk may be upright to maximally flexed at the hips with the head vertical and facing forward or horizontal and facing down. When used as a resting position the buttocks may rest on the heels while hip flexion is 45^{0} or less. The forelimbs need not perform any supportive function." (McGrew, 1972a, p. 91)

9. LEAN - The body weight will be placed against a stationary object or another person. Using the environment or another person to maintain balance, usually in an upright position.

10. CLIMB - Child uses arms (hands) and legs (knees) to transfer body weight through pushing and pulling. This consists of alternating

extension and flexion of all four limbs, resulting in a vertical gross body movement on an object or surface. Usually the legs push while the arms pull, but in descending the arms may push against the surface as well; always from one plane to the next. (Schneekloth and Burke, 1978).

11. CRAWL - "The body is moved quadrapedally, usually forward, with the ventral surface off the ground. Various parts of the limbs may touch the ground in different combinations: palms, forearms, knees and torus, soles. Body always horizontally in the same plane." (McGrew, 1972a, p. 108)

12. RIDE - The body may be sitting, lying, kneeling or squatting while being moved through space on a piece of equipment (i.e., swing, merry-go-round, wheeled toy). (Schneekloth and Burke, 1978)

13. HANG

Hang from arms: Hands grasped on object with total body weight suspended from that point or arms on supported body weight, i.e., to begin to climb.

Hang from legs: Body suspended from legs which are anchored or wrapped around support. Legs hold entire body weight.

Hang from arms and legs: Body suspended from arms and legs which are anchored or wrapped around support. Arm(s) and leg(s) support entire body weight.

Hang from body: Body suspended from object with trunk of body holding entire body weight. (Schneekloth and Burke, 1978)

14. SLIDE - Child in any position, i.e., sit, kneel, lie, etc., allowing body to move according to gravitational pull down on inclined plane.

15. FALL - "The body suddenly and violently moves down from an upright position to a horizontal one, usually onto the ground. During falling the body usually twists and the limbs flail without pattern, but the landing is usually on the buttocks, hands and knees. The hands are often brought ahead or in front of the head in falling forward. Falling may be involuntary or voluntary, and the latter may consist of actively 'throwing' the body toward another individual." (McGrew, 1972a, p. 97)

16. SCUTTLE - Child transfers weight through sliding body across the floor surface using hands to push or pull weight along. Contact with the floor is continually maintained. No particular positioning of the body is required in scuttling (most frequently in kneeling position), but merely that the arms are applying force to push or pull the body weight along the floor. (Schneekloth and Burke, 1978)

17. OTHER - Any gross motor pattern not listed above.

II. MANIPULATIVE

A. FINE MOTOR

1. FINGER OR EXPLORE - Fine motor movements with hands or fingers directed to a small object or to a limited aspect of a larger object

2. TOUCH - The hand is extended horizontally, fingers partially extended with palm side usually down. It is often directed toward an object and usually followed by grasping and picking up. The touch may be longer than a moment as when the hands are dragged along the surface of a stationary object or structure.

3. HOLD - The arm(s) or hand(s) are used to surround or support an object.

4. GRASP - The fingers of the hand are extended with palm side down and are wrapped around a small object or part of a larger object.

5. PUT/DROP

   a. PUT - Through hand and finger extension an object is purposefully placed. The movement of the object is intentional and not a result of gravity alone.

   b. DROP - "By hand and finger extension (with small objects) and arm extension (with large objects) an object is released without imparting force to it; its movement is a consequence of gravity." (McGrew, 1972a, p. 73)

6. OPEN/TWIST

   a. OPEN - The hand is usually turned with palm side down. The fingers are used to lift or pull a limited aspect of an object.

   b. TWIST - The fingers of the hand are separated with the palm side down. They are grasping a limited aspect of an object and the hand and forearm are moved in the horizontal plane in a clockwise and counterclockwise direction.

7. EAT/DRINK - Usually associated with the holding of an item of food. The drink or food is held in the hand palm side usually up. The forearm is raised, the thumb and index finger are usually employed in moving the food item directly to the mouth.

8. OTHER - Any other fine motor manipulative activity not mentioned above.

B. GROSS MOTOR

1. KICK - The leg is flexed and then explosively extneded at the knee and hip so that the foot moves forward toe first; the movement is oriented toward an object. In a standing posture the other leg remains upright, supporting the body; while sitting both legs may be kicked simultaneously. (Schneekloth and Burke, 1978)

2. THROW

   a. The forearm is extended forward, hand with palm up below shoulder level (and usually below waist), imparting force to a released object (underarm thrown), OR

   b. The forearm is extended forward, hand with palm down above shoulder level (and usually over head), imparting force to a released object (overarm throwing). Refers to motion only -- object may not be released. (Schneekloth and Burke, 1978)

3. STRIKE/DIG

   a. STRIKE - The arm raises to the vertical position and is brought down with an overarm blow with the palm side of the lightly clenched fist. (McGrew, 1972a)

   b. DIG - The arm raises to a vertical position and is brought down with an overarm movement. The movement is repeated and is usually directed toward the sand or dirt. The hand may hold an object or the fingers may be used as a tool.

4. ROCK - The trunk is moved backward - forward or sideways with repetitive movement, thus resulting in movement of the body and equipment. The individual is more or less upright, usually sitting or standing.

5. PUSH/PULL

   a. PUSH (Push self/object/other) - "The arms are extended forward, usually parallel and horizontal, with the wrists flexed and the palms preceding. Through this movement force is applied in contact with an object or person. Pushing is most commonly seen when the trunk is leaning forward while standing or sitting may also be combined in forward upright locomotion." (McGrew, 1972a, p. 82)

   b. PULL (Pull self/object/other) - The arms are flexed toward the body, usually the chest, thus drawing an object or person toward the body or the body toward them. Pull is usually preceded by reaching and grasping. This movement is always done with equipment or limited aspect of a larger structure." (McGrew, 1972a, p. 88)

6. CARRY - An object is taken from one place to another. The hand(s) and forearm(s) are usually used to support the object.

7. LIFT - A movement which raises an object or a body part from one level to another. Lifting is actually pushing and pulling in a vertical direction rather than a horizontal direction.

8. OTHER - Any gross motor manipulative activity not mentioned above.

C. MISCELLANEOUS

1. REACH OUT - The arm is extended horizontally, fingers partially extended and separated with the palm side usually down. It may be but is not always directed toward an object or person. (McGrew, 1972a)

2. AT REST - The hands are at rest at the side of the body or may be resting on the body.

III. SELF STIMULATION

A. GROSS MOTOR

1. BODY ROCK/SWAY - "The trunk is moved backward and forward (hips extension and flexion) or sideways (hip adduction and abduction with repetitive, rhythmic movement. The trunk is approximately upright in sitting or standing postures." (McGrew, 1972a, p. 102)

2. JUMP - "The child stands on the ground, then flexes the knees and pushes off the ground with both feet together or alternately, thereby bouncing up and down two or three times on the same spot. The hands are often held up about level with the chest and flapped up and down also, whereas in an ordinary jump the hands may be extended to aid balance." (Jones, 1972)

3. BOUNCE - Similar to body rock or sway except that the movement of the body is in the vertical plane. The body is either in the sitting position or standing. Arms are bent at the elbow and hands are held up about chest height.

4. HEAD SHAKE - The head is rotated rapidly upon the axis, to one side and then immediately back again in the opposite direction. This movement is repeated a number of times. (McGraw, 1972a)

5. CHEST BEAT - The hands are loosely fisted and arms are bent at the elbow. The loosely-fisted hands hit the chest in rapid repetitive movement.

6. HANDSHAKE/CLAP

CLAP - "The arms are held in front of the body, between waist and shoulder level, and brought rapidly together. The movements produce a sound." (McGrew, 1972a, p. 72)

HANDSHAKE - The arms are held in front of the body between the waist and shoulder. The hands are rapidly moved back and forth.

7. OTHER - Any other gross motor self stimulation behavior not listed above.

B. FINE MOTOR

8. FACE RUB - The hand is fisted loosely. The heel of the hand and back of the hand are used to rub the face.

9. EYE RUB/POKE

a. EYE RUB - The hand is fisted loosely. The heel and back of the hand are used to rub the eyes.

b. EYE POKE - This is more aggressive than eye rubbing. The fingers and thumb are used to poke at the eyes.

10. MOUTH - "The moving lips and gums contact an external object or body part. A small object being mouthed is often held in the hand, but a large object may be mouthed directly." (McGrew, 1972a, p. 63)

11. TOUCH SELF (ONCE) CONTACT - Momentary contact of self, body part or clothes.

12. FINGER/RUB - Fingering is the use of the fingers, particularly thumb and forefinger, to manipulate (or massage) part of one's body. (McGrew, 1972a)

13. HOLD SELF - The hands and arms are used to encircle or grip firmly a part of one's body.

14. SCRATCH - The tips of fingers or finger nails are raked across a body surface; the fingers are locked in partial flexion and usually separated. (McGrew, 1972a)

15. OTHER - Any other manipulative self stimulation behavior not listed above.

IV. SOCIAL AND PLAY BEHAVIORS

A. PHYSICAL

1. TOUCH - "Hand contact to another person. The hand may be placed just for a moment, or it may be rested on the person for a long period." (Jones, 1972, p. 275)

2. HOLD - "The arms are stretched out toward a person and his sides, or arms, are gripped firmly, restricting movement." (Jones, 1972, p. 272)

3. PAT - The forearm is rapidly and repeatedly flexed and extended so that the hand is moved vertically, palm side down toward another person. (McGrew, 1972a, p. 79)

4. GIVE/TAKE

   a. GIVE - The arm or arms are extended horizontally forward, fingers partially extended holding object; directed toward another child.

   b. TAKE - The arm or arms are extended horizontally forward, fingers partially extended together toward another child. An object is received in the extended hand and is brought in to the body.

5. HIT - The arm raises to the vertical position and is brought down with an overarm blow with the palm side of the hand. This action is directed toward another person. (McGrew, 1972a)

6. KICK - The leg is flexed and then explosively extended at the knee and hip so that the foot moves forward, toe first; the movement is oriented toward a person. In a standing posture the other leg remains upright, supporting the body; while sitting both legs may be kicked simultaneously (Schneekloth and Burke, 1978)

7. GRAB/PUNCH

   a. GRAB - Arms and fingers extended grasping forcibly another child and holding onto that child.

   b. PUNCH - The thumb and index finger are forcibly opposed with part of another's body in between. (McGrew, 1972a)

8. ROUGH/TUMBLE PLAY - This behavior occurs between two or more children while involved in physical contact. A complex combination of motor patterns, specifically patterns such as push, pull, fall, lean. (McGrew, 1972a)

B. VOCALIZATION

1. SING - Any utterance of a continued rhythmical or musical nature.

2. LAUGH - Open mouth smile together with audible vocalization.

3. TALK - Any utterance containing one or more recognizable words directed toward another person.

C. PLAY

1. FOCUS

   a. WATCH/LISTEN

      1. WATCH - The eyes and head are oriented toward another person or persons and the activity in which they are involved.

      2. LISTEN - The head or body posture is oriented toward another person or persons and the activity in which they are engaged. Similar to watch except that it does not involve the eyes.

   b. LONG DISTANCE - Watching or listening to a person or person's activities at a distance greater than five feet.

2. COOPERATIVE PLAY

   a. QUIET PLAY - Play is a 'blanket' term, used in a variety of ways. Essentially it refers to the manipulation of play materials of all kinds, and the taking part in imaginative games. Quiet play refers to play activities which are done in the stationary position or with very little gross motor or locomotor behaviors. (Jones, 1972)

b. ACTIVE PLAY - Play activities which involve gross motor and locomotor movements.

D. ALONE - To all appearances the child is not involved with any other person in the environment. This may or may not include physical separation.

E. OTHERS - Any behavior which involves contact with others, either peers or adults.

DEFINITIONS OF ENVIRONMENT

I. LOCATION

A. OPEN SPACE - Areas which are free from permanent objects and equipment.

1. HARD SURFACES - Any open area which has a flat surface that is asphalt, concrete or compacted dirt or grass.

2. GRASS - Any open area which is soft and grassy; it may be on a sloped surface.

B. TRANSITIONAL SPACE - Areas contined on at least two sides which tend to connect other areas.

1. SIDEWALK - Areas 2 to 3 feet wide which have a surface of concrete, asphalt or brick pavers.

2. STAIRS - Areas of 2 to 3 feet width which contain steps.

C. EQUIPMENT - All permenent features which protrude vertically in space. They may be play equipment, or boundary markers. A two foot area of "influence" surrounds each component of equipment before it would be considered open or transitional space.

II. ENVIRONMENTAL COMPONENTS

1. EQUIPMENT -

   a. MERRY-GO-ROUND - Standard Merry-go-round with 8' diameter.

   b. SLIDING BOARD - Standard sliding board, 2½' wide, 10' tall, accessible by narrow steps to sliding surface.

   c. SWINGS - Standard Swings with three wooden seats. The pipe structure anchored at four places, 15' tall.

   d. TREE SWING - A soft container (tire or fabric) suspended from a high tree limb which swings freely.

   e. SANDBOX - An area containing loose sand. At VSDB the sand was contained in a large plastic swimming pool (8' diameter); at BNS the sandwas contained in an area surrounded by railroad ties (12' diameter).

   f. TREE - Any large trees on either location. At each site some branches low enough to be climbed.

   g. FORT - A large complex play structure made up of different spaces, inclined planes, different materials, enclosed spaces, and accessible from many different places.

2. LARGE MANIPULABLE OBJECTS -

   a. WHEELED TOYS - Tricycles, bicycles, wagons and big wheels.

   b. OTHER - Boards, tires, and other large objects.

3. BOUNDARIES -

   a. RAIL - A metal divider or fence about 3' high which serves to differentiate one part of the play area from another marks property boundaries or serves as a safety division where there is difference in height between two areas.

   b. WALL - A divider that is wide enough to be used as a perch (1'+) ranging from 6" off ground to 2' from ground surface. At VSDB the wall was a retaining wall separating the concrete area from the sloped grass; at BNS the wall surrounded the sandbox.

4. RELATIONSHIP -

   a. ON/IN - Inside, on top of, or underneath any of the environmental components.

   b. AT - Within 2' of any environmental component but not on or in it.

5. MANIPULABLE OBJECTS - any object which is small enough to be held in the hands; includes amorphous materials, natural objects, toys, books, food and pieces of larger objects.

6. SELF - Any part of the body or clothes.

7. OTHERS -

   a. PEERS - Interaction with any other child.

   b. ADULTS - Interaction with anyone of 17 years or older, usually a caretaker or researcher.

APPENDIX D MOTOR PROFICIENCY ITEMS

PRETEST: Arm and Leg Preference

The pretest has two items that determine the subject's arm and leg preference. Since many of the subtest items require the use of the preferred arm or leg to perform tasks, the subject's preference, or lack of preference, should be established before the test is administered.

Pretest/Item 1: Arm Preference

The subject throws a tennis ball overhand to the examiner.

Administering and Recording. Hand the ball to the subject, stand about 10 feet (3 meters) from the subject, and say: Throw the ball to me like this. Demonstrate an overhand throw; the ball is not to be thrown underhand.

After the ball has been thrown once, hand it to the subject and say: Now throw it again.

If some uncertainty exists as to which arm is preferred, have the subject throw the ball with the other arm. If uncertainty still exists, have young subjects show you how they brush their teeth, comb their hair, or write.

Circle right or left on the Individual Record Form to record the subject's arm preference. If the subject does not show a preference, circle mixed and allow the subject to use either arm when a subtest item specifies the use of the preferred arm.

Pretest/Item 2: Leg Preference

The subject kicks a tennis ball to the examiner.

Administering and Recording. Place the tennis ball on the floor between the subject's feet and say: Kick the ball to me.

After the ball has been kicked, place it on the floor and say: Now kick the ball again.

If some uncertainty exists as to which leg is preferred, have the subject kick the ball with the other leg.

Circle right or left on the Individual Record Form to record the subject's leg preference. If the subject does not show a preference, circle mixed and allow the subject to use either leg when responding to the first three items in Subtest 2: Balance.

SUBTEST 2: Balance

Subtest 2/Item 3: Standing on Preferred Leg on Balance Beam - Eyes Closed

The subject stands on preferred leg on the balance beam, with eyes closed, hands on hips, and with other leg bent so that it is parallel to the floor. The subject must maintain the position for 10 seconds to achieve a maximum score.

Trials: 2. Administer a second trial only if the subject does not achieve a maximum score on the first trial.

Administering and Recording. Say: Stand on the beam on your (right/left) leg and raise your other leg like this (demonstrate). Place your hands on your hips and look at the target. Now close your eyes and stand like this until I tell you to stop.

If necessary, help subject achieve correct position. Begin timing as soon as position is achieved and remind the subject as needed to keep hands on hips. Slight swaying is acceptable. Allow only one warning to keep the raised leg parallel to the floor (or above a 45° angle).

After 10 seconds tell the subject to stop. Stop the trial and record the time before 10 seconds if the subject:

(a) drops the raised leg so that it touches the floor or beam

(b) drops the raised leg below a 45° angle after one warning

(c) hooks the raised leg behind the supporting leg

(d) shifts the supporting foot out of place

(e) opens eyes.

On the Individual Record Form, record to the nearest second the time that the subject maintains the correct position.

Remove the balance beam from walking line and remove target from wall.

Subtest 2/Item 7: Walking Forward Heel-to-toe on Balance Beam

The subject walks forward on the balance beam heel-to-toe, with hands on hips. The subject must make six consecutive steps correctly to achieve a maximum score.

Trials: 2. Administer a second trial only if the subject does not achieve a maximum score on the first trial.

Administering and Recording. Place the balance beam over the walking line.

Have the subject stand at one end of the beam. Say: Place your feet on the beam like this (demonstrate). Place your hands on your hips. When you walk down the beam, hit the toe of your back foot with the heel of your front foot (demonstrate). Walk to the end of the beam. Remember, keep your feet on the beam and your hands on your hips as you walk. Ready, begin.

Stand at one side of the beam and count the subject's steps, keeping track of both correct and incorrect steps. A step is incorrect if the subject:

(a) does not touch the heel of the front foot to the toe of the back foot

(b) moves the back foot forward to touch the heel of the front foot.

Remind the subject as needed to walk heel-to-toe and to keep hands on hips. After six steps have been taken, tell the subject to stop. If the subject places one or both feet completely off the beam before taking six steps, stop the trial and record the number of steps taken on the beam.

On the Individual Record Form, record the number of correct and incorrect steps. Use "1" for correct steps and "0" for incorrect steps. For example, 1-1-0-1-1-0 equals a score of 4.

SUBTEST 3: Bilateral Coordination

Subtest 3/Item 1: Tapping Feet Alternately While Making Circles with Fingers

The subject taps feet alternately while making circles with index fingers. The subject is given 90 seconds to complete ten consecutive foot taps correctly. The score is recorded as a pass or a fail.

Trials: 1

Administering and Recording. Place two chairs facing each other; have the subject sit facing you. The subject's arms are held at, or slightly below, shoulder height with elbows bent and index fingers pointing toward the examiner. One index finger is to move clockwise and the other counterclockwise.

Say: First tap one foot and then the other foot like this (demonstrate). At the same time you tap your feet, hold your arms in front of you and close your hands, pointing your first (index) fingers to me like this (demonstrate). Make circles with just your fingers; try not to move your hands, wrists, or arms (demonstrate). Keep tapping your feet and making circles with your fingers until I tell you to stop. Ready, begin.

(The subject may tap toes with heels resting on floor, tap with the entire foot, or tap heels with toes resting on floor, as long as the tapping rhythm is consistent.)

Begin timing. If necessary, provide additional instruction. Start counting taps as soon as the subject establishes a consistent tapping rhythm. During the trial, correct the subject and start

counting over if he or she:

(a) does not maintain a consistent tapping rhythm

(b) fails to alternate feet

(c) fails to make circles simultaneously with both fingers

(d) uses wrists and forearms in making circles

(e) fails to make complete circles. (Wiggling fingers is incorrect.)

Allow no more than 90 seconds, including time needed for additional instruction, for the subject to complete ten consecutive foot taps correctly. After 90 seconds tell the subject to stop.

On the Individual Record Form, record pass or fail.

Subtest 3/Item 6: Jumping Up and Clapping Hands

The subject jumps up as high as possible, clapping hands in front of face as many times as possible before landing. The subject must clap five times to achieve a maximum score.

Trials: 2. Administer a second trial only if the subject does not achieve a maximum score on the first trial.

Administering and Recording. Stand facing the subject and say: When I tell you to begin, jump straight up as high as you can. As you jump, clap your hands in front of your face as many times as you can before you land (demonstrate). Ready, begin.

Count claps as subject jumps. Do not count claps that are made while subject's feet are on the floor or claps that are made below chest level. Mark the trial "0" if the subject loses balance and touches the floor with one or both hands when landing.

On the Individual Record Form, record the number of claps made correctly.

SUBTEST 4: Strength

Subtest 4/Item 1: Standing Broad Jump

The subject jumps forward as far as possible, starting from a bent-knee position. The distance of each jump is recorded.

Trials: 3

Administering and Recording. Have the subject jump up and down a few times before starting. Then say: Stand behind this line (pointing to starting line) with your feet spread about as far apart as your shoulders (demonstrate). Bend your knees, lean forward, and swing your arms at your sides a few times. When I say go, put your arms back and jump forward as far as you can, letting your arms swing forward and land on both feet (demonstrate). Remember, bend your knees, swing your arms back, and jump as far as you can. When you jump, let your arms swing forward and try to land on both feet. If you lose your balance, try to fall forward. Ready, go.

Between trials repeat instructions as necessary.

Correct the subject and readminister the trial if the subject shuffles over the starting line before jumping or if the subject jumps up instead of forward.

On the Individual Record Form, record the distance jumped on each trial by noting the number that is nearest the point where the back of the subject's heels land. If one foot lands behind the other, measure to the heel that is nearest the starting line. If the subject loses balance and falls backward, measure to the point where the subject's hands (or other part of the body nearest the starting line) touch the floor.

Subtest 4/Item 2: Sit-ups

The subject does sit-ups, raising the upper portion of the body from the floor and touching fingertips to the response speed stick held across the subject's knees by the examiner. The number of correct sit-ups performed in 20 seconds is recorded.

Trials: 1

Administering and Recording. Have the subject lie on a gym mat or carpeted surface. Kneel beside the subject and say: Lie flat on your back. Place your hands on the top part of your legs like this (demonstrate, placing hands palms down on thighs). Put your chin on your chest. Keep your arms and your shoulders straight and sit up until your fingers just touch this stick. Place the stick across the subject's knees. Then say: After you touch the stick, lean back until you are lying on the floor again. Have the subject do a practice sit-up. Demonstrate if necessary; make certain the subject understands the procedure. Then say: When I say go, keep doing sit-ups as fast as you can until I tell you to stop. Sit up just high enough to touch the stick. Ready, go!

Begin timing. Count the number of correct sit-ups. A sit-up is incorrect if the subject:

(a) pushes from the floor with elbows

(b) pulls on slacks or mat while sitting up

(c) fails to touch the response speed stick with at least one finger.

During the trial, encourage the subject to perform as fast as possible. Repeat instructions as necessary. For example, if the

subject twists sideways to sit up, remind him or her to keep shoulders straight. After 20 seconds, tell the subject to stop.

On the Individual Record Form, record the number of sit-ups performed correctly.

Subtest 4/Item 3 (Versions a and b)

(Administer the version appropriate for the subject's age and sex.)

Item 3a: Knee Push-ups (for boys under age 8 and all girls)

The subject does knee push-ups, supporting the body with hands and knees and raising the back to touch the response speed stick held above the subject's back by the examiner. The number of correct knee push-ups performed in 20 seconds is recorded.

Trials: 1

Administering and Recording. If a gym mat or carpeted surface is used, place it so that one edge touches the base of a wall. Have the subject lie on the gym mat or carpeted surface. Kneel beside the subject and say: Lie flat on your stomach. Place both hands flat on the mat, next to your shoulders, and bend your knees. Now move back so that your knees just touch the wall. Assist the subject as necessary. Then hold the response speed stick over the subject's back at the waist; the stick should be held so that the subject's back just touches it when the subject's arms are fully extended. Say: Keep your back straight and push yourself up until your arms are straight and your back just touches the stick. After you touch the stick, lower yourself until you touch the floor with your chest. Have the subject do a practice push-up. Demonstrate if necessary; make certain that the subject understands the procedure. If necessary,

help the subject achieve the correct position before pushing up. Then say: When I say go, keep doing push-ups as fast as you can until I tell you to stop. Keep your back straight and push up until your arms are straight. When you lower yourself, touch the floor with your chest. Ready, go!

Begin timing. Count the number of correct push-ups. If the subject's back and arms are straight, but the subject fails to touch the response speed stick, adjust the height of the stick and count the push-up. Also count a push-up when the subject's chest does not touch the floor, as long as the subject lowers himself or herself enough to achieve a full bent-arm position. A push-up is incorrect if the subject:

(a) fails to touch the response speed stick because he or she has allowed the back to sag

(b) lifts hips so that the back is not straight.

During the trial, encourage the subject to perform as fast as possible. After 20 seconds, tell the subject to stop.

On the Individual Record Form, record the number of knee push-ups performed correctly.

Item 3b: Full Push-ups (for boys age 8 and older)

The subject does full push-ups, supporting the body with hands and toes, and raising the back to touch the response speed stick held above the subject's back by the examiner. The number of correct full push-ups performed in 20 seconds is recorded.

Administering and Recording. If a gym mat or carpeted surface is used, place it so that one edge touches the base of a wall. Have

the subject lie on the gym mat or carpeted surface. Kneel beside the subject and say: Lie flat on your stomach. Place both hands flat on the mat, next to your shoulders. Place your feet against the wall. Assist the subject as necessary. Then hold the response speed stick over the subject's back at the waist; the stick should be held so that the subject's back just touches it when the subject's arms are fully extended. Say: Keep your back straight and push yourself up until your arms are straight and your back just touches the stick. After you touch the stick, lower yourself until you touch the floor with your chest. Have the subject do a practice pushOup. Demonstrate if necessary; make certain that the subject understands the procedure. Then say: When I say go, keep doing push-ups as fast as you can until I tell you to stop. Keep your back straight and push up until your arms are straight. When you lower yourself, touch the floor with your chest. Ready, go!

Begin timing. Count the number of correct push-ups. If the subject's back and arms are straight, but the subject fails to touch the response speed stick, adjust the height of the stick and count the push-up. Also count a push-up when the subject's chest does not touch the floor, as long as the subject lowers himself enough to achieve a full bent-arm position. A push-up is incorrect if the subject:

(a) fails to touch the response speed stick because he has allowed the back to sag

(b) lifts hips so that the back is not straight.

During the trial, encourage the subject to perform as fast as

possible. After 20 seconds, tell the subject to stop.

On the Individual Record Form, record the number of full push-ups performed correctly.

SUBTEST 5: Upper-Limb Coordination

Subtest 5/Item 7: Touching Nose with Index Fingers - Eyes Closed

With eyes closed, the subject touches any part of his or her nose first with one index finger and then with the opposite index finger. The subject is given 90 seconds to touch the nose four consecutive times.

Trials: 1

Administering and Recording. Have the subject stand facing you. Say: Hold your arms straight out to the side. Close your hands and point with your first (index) fingers (demonstrate). Touch your nose with the tip of one of your fingers and then put your arm straight out again (demonstrate). Then touch your nose with the other fingertip and put that arm straight out again (demonstrate). Now do it with your eyes closed and your head still. Keep touching your nose until I tell you to stop. Ready, begin.

Begin timing. If necessary, provide additional instruction. For example, remind the subject to touch the nose with the tips of the index fingers and to return one arm to an extended position before moving the other arm. Start counting as soon as the subject is moving the arms and touching the nose correctly in a continuous movement. During the trial correct the subject and start counting over if she or he:

(a) fails to maintain continuous movements

(b) fails to touch the nose with the index finger

(c) fails to alternate arms

(d) fails to extend arms fully after touching nose

(e) moves head to meet the finger

(f) opens eyes.

Allow no more than 90 seconds, including time needed for additional instruction, for the subject to touch the nose correctly four consecutive times (twice with each finger). After 90 seconds tell the subject to stop.

On the Individual Record Form, record pass or fail.

Subtest 5/Item 8: Touching Thumb to Fingertips - Eyes Closed

With the eyes closed, the subject touches the thumb of the preferred hand to each of the fingertips on the preferred hand, moving from the little finger to the index finger and then from the index finger to the little finger. The subject is given 90 seconds to complete the task once. The score is recorded as a pass or a fail.

Trials: 1

Administering and Recording. Have the subject sit beside you at a table. Have the subject extend the preferred arm. Then say: You are to touch your thumb to each of the fingertips on this hand. Start with your little finger and touch each fingertip in order. Then start with your first finger and touch each fingertip again as you move your thumb back to your little finger (demonstrate). Do this with your eyes closed until I tell you to stop. Ready, begin.

Begin timing. If necessary provide additional instruction. During the trial correct the subject and have the subject start over if he or she:

(a) fails to maintain continuous movements

(b) touches any finger except the index finger more than once in

(c) touches two fingers at the same time

(d) fails to touch fingers above the first finger joint

(e) opens eyes.

Allow no more than 90 seconds, including time needed for additional instruction, for the subject to complete the task once. After 90 seconds, tell the subject to stop.

On the Individual Record Form, record pass or fail.

SUBTEST 8: Upper-Limb Speed and Dexterity

Subtest 8/Item 1: Placing Pennies in a Box with Preferred Hand

With the preferred hand, the subject places pennies one at a time into an open box. The number of pennies placed into the box correctly in 15 seconds is recorded.

Trials: 1 practice, 1 recorded.

Administering and Recording. Place the testing pad in front of the subject. Arrange the 24 pennies in three rows of eight on the testing pad, between the subject and the box. Say: When I say go, put the pennies into the box one at a time as fast as you can with your (right/left) hand. You do not have to pick up the pennies in any special order. Use only one hand and do not throw the pennies into the box (demonstrate). Put your other hand in your lap. Now you try it. As a practice trial, have the subject place five pennies into the box. The subject's hand should be over the box when releasing the penny. If the subject starts to throw the pennies into the box, remind her or him to hold hand over the box and to drop the penny into the box. Return the five pennies to their original positions on the testing pad. Say: Keep putting pennies into the box until I tell you to stop. Remember to use your (right/left) hand and put the pennies into the box one at a time as fast as you can. Ready, go!

Begin timing when the subject touches a penny. Count the number of pennies placed in the box correctly. If the subject picks up more than one penny at a time, give credit for only one penny. Do not give credit if the subject throws pennies into the box after one warning. During the trial repeat instructions as necessary. If the subject

changes hands, readminister the trial. After 15 seconds, tell the subject to stop.

On the Individual Record Form, record the number of pennies placed in the box correctly.

Subtest 8/Item 2: Placing Pennies in Two Boxes with Both Hands

The subject simultaneously picks up a penny with each hand and places the pennies into separate boxes. The pennies are arranged in two rows of 6 on either side of two boxes which are placed in the center of the testing pad. This is a total of 24 pennies. The subject is given a maximum of 50 seconds to place seven pairs of pennies into the boxes correctly. The time taken to complete the task is recorded.

Trials: 1 practice, 1 recorded.

Administering and Recording. Say: When I say go, pick up one penny with each hand at the same time (demonstrate). Then put one penny into each box at the same time as fast as you can (demonstrate). You do not have to pick up the pennies in any special order. Now you try it. As a practice trial, have the subject place two pairs of pennies into the boxes. If necessary, remind the subject not to throw the pennies into the boxes. Then return the pennies to their original positions on the testing pad. Say: Keep putting pennies into the boxes with both hands at the same time as fast as you can until I tell you to stop. Do not throw the pennies into the boxes. Ready, go!

Begin timing when the subject touches a penny. Record a slash mark (/) in one of the boxes on the Individual Record Form for each properly placed pair of pennies. If the subject picks up more than

one pair at a time, give credit for only one pair. Do not give credit for pennies thrown into the boxes after one warning or for pairs not put into the boxes simultaneously. After the subject has placed seven of the twelve pairs correctly, or after 50 seconds, tell the subject to stop.

On the Individual Record Form, record the time to the nearest second. Record a score of 50 seconds if the subject places fewer than seven pairs of pennies into the boxes correctly.

APPENDIX E EQUIPMENT

APPENDIX E-1

POCS

PLAY OBJECT COMPLEXITY SCALE

Instructions

The Play Object Complexity Scale (POCS) is a measurement scale developed to rate the suitability of play equipment for young children. With this scale you can rate your play equipment in order to assess its value for children. For rating purposes a single piece of play equipment is defined as a physical structure including all components which are physically attached.

The suitability of the equipment is based on the complexity of certain physical elements, offering this as an index for diversity of experiences available to young children. In order to assess the play equipment, there are a series of 14 item categories. These categories have been divided into 3 divisions: Physical Properties, Space Organizers and Moveable Parts. After the item category name is a definition and some further notes you may find useful. You are to count how many times this physical feature appears.

Try to be accurate. Be particularly careful not to let your eye fill in parts that are not physically present. However, if there is some confusion over a certain category, use your common sense.

Complete the following the rate a piece of equipment:

1. NAME
   Write the name of the first piece of equipment you want to rate in the box at the top of page 1 under Equipment #1. If the equipment has no formal name, call it by whatever name appeals to you.

2. COUNT
   Count the number of times each physical feature described appears on the piece of equipment for items 1-11. For 12, 13 and 14, note if the characteristic is present.

3. ASCRIBE VALUE
   Find the value for the number you have counted for each category. For example, if the object has 46 "Edges", it should receive a value of 1; if it has 90 "Rungs and Chains", it should receive 3.

EXAMPLE:

DIVISION: PHYSICAL PROPERTIES	Equipment #1 Swing		Equipment #2 R.Box		Equipment #3 B.S.	
	Freq.	Value	Freq.	Value	Freq.	Value
4. RUNGS AND CHAINS a. A graspable object of rounded form, usually metal or wood. b. Chains or cables. Examples: rungs of a ladder; poles of swing set	90	3	0	0	21	0

4. ADD
   Add all the value points for one piece of equipment and enter that number under "Total Value Points" on the bottom of the second page.

5. RATE EQUIPMENT
   Look at the chart at the bottom of the second page to determine the equipment rating. Each piece of equipment will have a rating of I, II or III, reflecting a level of complexity and suitability for young children.

6. Repeat the process for Equipment #2 and Equipment #3.

DIVISION: PHYSICAL PROPERTIES	Equipment #1		Equipment #2		Equipment #3	
Item Categories	No.	Value	No.	Value	No.	Value
1. HEIGHT Distance from ground to top of object.		0-3'=0 4'+ =1		0-3'=0 4'+ =1		0-3'=0 4'+ =1
2. MATERIALS The different kinds of materials from which the object is constructed. Examples: wood, rope, plastic, sand, metal		0-2=0 3+ =1		0-2=0 3+ =1		0-2=0 3+ =1
3. COLORS The different colors of the object, either painted or the natural color of the materials.		0-3=0 4+ =1		0-3=0 4+ =1		0-3=0 4+ =1
4. RUNGS AND CHAINS a. A graspable stick of rounded form, usually metal or wood. b. Chains or cables. Examples: rungs of a ladder; poles of swing set		0-22=0 23-44=1 45-66=2 67+ =3		0-22=0 23-44=1 45-66=2 67+ =3		0-22=0 23-44=1 45-66=2 67+ =3
5. TIRES IN NON-HORIZONTAL PLANE More than two tires grouped in any position other than horizontal to the ground. Example: tire trees		0=0 1+=1		0=0 1+=1		0=0 1+=1
DIVISION: SPACE ORGANIZERS						
6. SURFACES - HORIZONTAL Any surface horizontal to the ground. -must be larger than 1 sq. foot -long series of steps not to be counted individually; whole series counted as 1 Examples: any platform; crowsnest		0-2=0 3-4=1 5-6=2 7+ =3		0-2=0 3-4=1 5-6=2 7+ =3		0-2=0 3-4=1 5-6=2 7+ =3
7. SURFACES - NON-HORIZONTAL AND NON-VERTICAL a. An inclined surface. b. A curved, rigid surface. Examples: sliding board; inclined boards; culverts		0=0 1=1 2=2 3+=3		0=0 1=1 2=2 3+=3		0=0 1=1 2=2 3+=3
8. EDGES A border or boundry joining two surfaces; the line at which two surfaces meet. -rungs and poles are not edges. -rounded, continuous borders, as circles, counted as 1 continuous edge. -two parallel surfaces, an upper and lower surface, if 3" apart or less, are counted as having 1 edge rather than 2. Examples: a cube has 12 edges; a tire has 4 edges		0-30=0 31-60=1 61-90=2 91+ =3		0-30=0 31-60=1 61-90=2 91+ =3		0-30=0 31-60=1 61-90=2 91+ =3
9. ENCLOSED SPACES Any space enclosed by surfaces or rungs on at least three (3) sides, including floor or ground. -approximation: larger than 2 sq. feet and smaller than 15 sq. feet. (Give 1-3 children a sense of enclosure.)		0-1=0 2-3=1 4-5=2 6+ =3		0-1=0 2-3=1 4-5=2 6+ =3		0-1=0 2-3=1 4-5=2 6+ =3

Item Categories (Space Organizers, con't.)	Equipment #1 No.	Equipment #1 Value	Equipment #2 No.	Equipment #2 Value	Equipment #3 No.	Equipment #3 Value
10. ACCESS POINTS - EXTERNAL Any point at which an object is accessible to or from the ground. -continuous rounded edge as a circle has 4 access points if the object is larger than 2' diameter. Examples: steps; ladders; fireman's poles; tunnels; nets		0-5=0 6-10=1 11-15=2 16+ =3		0-5=0 6-10=1 11-15=2 16+ =3		0-5=0 6-10=1 11-15=2 16+ =3
11. ACCESS POINTS - INTERNAL LINKS Connecting points within an object which link one area to another; which link one physically distinct part to another physical distinct part. -there must be some physical differentiation (size, plane, material) to indicate parts -series of steps not considered series of internal links, but point of transfer from steps onto another part is counted as one link. -metal jungle gyms arbitrarily assigned 6 internal links. Examples: top of ladder onto horizontal surface; hole from one space into another		0-5=0 6-10=1 11-15=2 16+ =3		0-5=0 6-10=1 11-15=2 16+ =3		0-5=0 6-10=1 11-15=2 16+ =3
DIVISION: MOVEABLE PARTS						
	Yes		Yes		Yes	
12. FIXED MOVING PARTS Any part of an object which is attached at one or more points, but which is free to move within a circumscribed area. Examples: swing; cargo net		2		2		2
13. DISMOUNTABLE OR NOT PERMANENTLY FASTENED Any object, because of size or weight, which can be moved by adults, but not children. -any object put together by bolts or a similar system -not cemeted or permanently anchored to ground. Examples: Big Toys; boxes bolted together; etc.		2		2		2
14. MANIPULABLE a. Any object, because of size or weight, which can be moved by a child through space. b. Any equipment, or group of objects, joined together in non-fastened manner, whose individual pieces can be moved by a child. (At least 5 components) Examples: boards; boxes; A-frame metal structures; sand; water		3		3		3
TOTAL VALUE POINTS						

LEVEL OF COMPLEXITY	Value Points	#1	#2	#3
High	13+			
Middle	7-12			
Low	0-6			

APPENDIX E-2

RATING OF PLAY EQUIPMENT BY POCS

Physical Attribute Measured	MGR	slide	swing	T-swing	sandbox	tree	fort	wheels	non-wheels	rail	wall
1. Height	0	1	1	1	0	1	1	0	0	0	0
2. Materials	0	0	0	0	0	0	0	0	0	0	0
3. Colors	1	0	0	1	0	0	0	1	0	0	0
4. Rungs & Chains	1	0	0	0	0	1	0	0	0	0	0
5. Tires-non-hor.	0	0	0	1	0	0	1	0	1	0	0
6. Surfaces-horizontal	0	0	1	0	0	0	3	0	0	0	0
7. Surfaces-non-hor.	0	1	0	0	0	1	3	0	1	0	0
8. Edges	0	0	0	0	0	3	3	1	1	0	0
9. Enclosed space	3	0	0	0	0	2	4	0	1	0	0
10. Access-external	0	0	1	0	0	0	2	0	0	0	0
11. Access-internal	0	0	0	0	0	1	1	0	0	0	0
12. Fixed moving parts	2	0	2	2	0	2	0	2	0	0	0
13. Dismountable	0	0	0	2	0	0	2	0	0	0	0
14. Manipulable	0	0	0	0	3	3	0	3	3	0	0
Rating	7	2	5	7	3	14	20	7	7	0	0

Level of Complexity	Value Points
High	13+
Medium	7 - 12
Low	0 - 6

APPENDIX F VITAE

LYNDA H. SCHNEEKLOTH

RESUME

Education:

9/72 - 5/76	M. S. Landscape Architecture, University of Wisconsin, Minors in Child Development, Curriculum & Instruction.
1/68 - 6/70	B. A. Cum Laude, University of Wisconsin, Department of English.
1/66 - 6/66	University of Missouri at Kansas City, Kansas City, Missouri.
9/61 - 6/63	George Washington University, Washington, D. C.

Teaching Experience:

9/76 - Present — Assistant Professor, Professional and Graduate Division.

Teaching Responsibilities

- Courses
  Human Environmental Factors - Graduate Introduction to Human/Environment Theory and Methods;
  Behavioral Responses to Man-Made Environment - Developed new curriculum involving experiential learning and group processes;
  Descriptive Environmental Systems.

- Design Studios
  Social Spaces (1976-77); Roanoke Participatory Design Project (1977-78); Play Environments for Visually Handicapped (1978-79); and Urban Infill Housing (1979).

- Team Teaching in professional core studio (12 units). Major responsibility for programming and siting section (1978-79).

- Seminars
  Learning Environments (1977); User Involvement in Planning and Design (1978-79); Life Space and Architecture in Utopian Societies (1979-80).
- Thesis Advisor (4 years)
  - Undergraduate (30)
  - Graduate (19)

Director, Environmental Design/Behavioral Studies Laboratory
- Research in Environmental Design
- Curriculum Development
- Consultant for students and faculty on behavioral issue in Design.
- Lecturer and speaker in various studios and courses.

6/77	Adjunct Faculty, June Institute, Human Ecology Center, Antioch College, Columbia, Maryland.
1/75 - 5/75	Teaching Assistant, "Introduction to Landscape Architecture," University of Wisconsin, Madison, Wisconsin.
6/72 - 6/75	Teaching Assistant, Department of Curriculum and Instruction, School of Education, University of Wisconsin, Madison, Wisconsin.
9/71 - 6/72	Teacher, Eagle Heights Nursery School, Madison, Wisconsin.

Research Experience:

"Post-Occupancy Evaluation of Federal Sec. 8 Housing." Three housing projects are being evaluated for user satisfaction for Virginia Housing and Development Authority as focus of graduate seminar. (January-June, 1980).

"Comparison of Motor Activity and Environmental Interaction of Visually Handicapped and Sighted Children," Principle Investigator. (Sept. 1979-Aug. 1980).

Using a quasi-experimental research design, the gross motor, manipulative, stereotypic and social interactions and their environmental dimensions are observed in school-aged blind, partially sighted and sighted children (12 each group) during free time in their usual play environment.

Using time sampling techniques, data are being taken for 6 observation periods, 5 observations each time, with an average of 6 behaviors recorded during each ten second interval, resulting in approximately 1800 behaviors/group. Analysis will look at behaviors across groups for frequency and diversity of behaviors, kinds of environmental interactions, objects, equipment, spaces, etc., with the intent of developing more suitable play environments for visually handicapped children to promote their development.

Funded: 1979-80 from Bureau of Education for the Handicapped, $5,500.

"Design and Evaluation of a Play Environment for Visually Impaired Children" (1978-79).

Research, planning and design of an outdoor play environment for the blind and visually impaired children at the Virginia School for the Deaf and Blind in Staunton. Construction is planned for Summer 1980.

Funded: Seed grant from College of Architecture, $800 to build prototypes.

"On Owning a Piece of the Rock: Participatory Design" Principle Investigator (1977-79).

Coordination of a three year project focused on the planning and design of a new church and community facility in Roanoke, Virginia. The First Baptist Church, a black congregation, is committed to building in the decaying neighborhood of Gainsboro and has had the foresight to recognize the opportunity of new construction as an impetus for growth and community renewal.

Our goals are to test various participatory design methods including on C. Alexander's Pattern Language, Halprin's scoring techniques and methods of group processes developed by applied behavioral sciences.

Funded: Seed grant $350 from First Baptist Church.

Funded: "Translating Visions" with Appalshop Film Makers $30,000 from NEA to make film of project.

6/74 - 7/76 "Children's Motor, Social and Proxemic Behaviors in Structured Space", University of Wisconsin, Madison, Wisconsin, Research Associate.

Abstract: This research employed a modified ethological "field study" strategy with certain E variables controlled, and systematic data collection, transformation and analysis procedures. A second important purpose of the study involved the development of methods for quantifying the relationship between selected aspects of designed play environments and gross motor proxemic behaviors in young children.

Funded: HATCH, 1975-1977 with Richard Blakeley, Department of Landscape Architecture.

2/74 - 5/74 Research Assistant for M. Paul Friedburg, Landscape Architect, New York.

Extension Service:

1980 "Strategies for Environmental Interventions" Training Workshop for teachers and staff at Virginia School for the Deaf and Blind, (January 26, 1980).

1979 "Let the Kids Have Fun Too!" Training program for design students to work with children in organizing and facilitating environmental design 3 day workshop at 1979 AIA convention. (June 1979).

1977 - Present Consultant to First Baptist Church, Roanoke, Virginia, to develop planning and design process for their new church. Includes following workshops:

"Pattern Language Design Workshops," a group of 75 people worked one month in developing 500 patterns specific to this church project, May 1979.

"Visitation" - a workshop for 50 members incorporated a structured visit to other churches. November 26, 1978.

"Close Encounters of the Fun Kind" - a workshop and event for community and church members to explore the neighborhood and share experiences (30 people). June 4, 1978.

"A Beginning for the New Church Building" - a workshop for 200 members to explore their goals and mission and to identify opportunities in their new construction program. This effort resulted in the initial program for their new buildings. March 12, 1978.

1978 - 79 Consultant and design assistance to the Virginia School for the Deaf and Blind to develop play area for their blind population.

1979 - Present Neighborhood Revitalization Task Force, Roanoke, Virginia.

College and University Service:

1979 - 80 Advisor to Minority Students

1979 Member of Task Force for NSF Grant to establish priorities in Environmental Design Research.

1977 - 79	College Curriculum Committee
1977 - 79	Graduate Admissions Committee
1976 - 77	Member of Task Force to develop proposal to NEH for Program in Humanities (1976-77).
1977	Technical Advisor and Consultant to Media Services for "City Stress," a series of five one-half hour TV shows produced by NBC for program knowledge. The programs focus on needs of different age groups in an urban environment and have been shown repeatedly in the DC metropolitan area.

Selected Consulting:

Senior Partner, Consultants for Environmental and Organization Change, Alexandria, Virginia, 1978-present.

"Neighborhood Planning and Technical Assistance Program" City of Roanoke, Virginia. Consult on city wide program to organize communities and realize self-help potentials. Summer 1980

"Use of Environments: An Active Tool in Learning", training in use of environments for teachers and staff. Project Imprint Convention, Fairfax, Virginia, March, 1980.

Consultant for programming of Elderly Daycare Center; Florida Gerontological Association, University of Florida, Gainsville, February 1980.

"Improving Client/Designer Relations" Presentation to Virginia Chapter ASLA, February 1980.

Preprogramming Consultation for Virginia Beach Arts Center, Spring 1979.

Programming and Design of Vacation Homes for Chitwoods and Anderson, Chesapeake Bay, MD, 1979 - present.

Consultant, Nakoma Neighborhood Association, Madison, Wisconsin, for proposed neighborhood playground, 1975.

Consultant and Designer, Orchard Ridge Elementary School Playground, Madison, Wisconsin, 1974.

Consultant, Dugeon Neighborhood Association, Madison, Wisconsin, for recreation planning and design, 1974.

Presentation and Workshops:

"Design Guidelines for Environments for Visually Impaired Children," Workshop for Training Staff in Technique of Environmental Interventions, International Council for Exceptional Children, Philadelphia, April 1980.

"Epistemological Considerations in Research, Teaching, Policy and Practice in Man Environment Relations" with Ed Ostrander, EDRA," Charleston, S. C., March 2-6, 1980.

"Creative Collaboration with Clients," A two day training session with third year architecture students incorporating dynamics of good group work and participatory methods. University of Florida, Gainsville, February 1980.

"Patterns as Design Generators: The Translation of Behavioral Objectives into Form Criteria." SW Regional ACSA meeting, Gainsville, Florida, November 1979.

"Teaching Human/Environmental Interactions in Schools of Design"; June 1979, EDRA Conference, Buffalo, New York.

"Play Environments for Visually Impaired Children" International Conference for Exceptional Children, April 1979, Dallas, Texas.

"Finding Privacy in a Crowded World" presentation to American Home Economics Association National Meeting, February, 1979.

"Charette on Pattern Language" with Robert Harris, Dean, School of Architecture and Allied Arts, University of Oregon, at VPI & SU. October 1977.

"Myths and Realities: Participatory Planning and Design" with Michael Appleby, VPI & SU and Robert Shibley, CEOC, Washington, D. C., March 1977.

"Design for Learning and Play" - a series of events concerned with the design of Play and Learning Environments for infants and young children, with Richard Chase and Michael Williams, VPI & SU, February 1977.

"Direct Methods for Observing Child/Enviroment Interactions" with Coryl Jones, Lee Shaw, Leanne Rivlin and Richard Chase. Presented at EDRA 8, Champaign, Illinois, April 1977.

"The Creative Process in Human Relations," participant. Edgewood College, Madison, Wisconsin, June 20 - July 8, 1977.

"Children's Motor, Social and Proxemic Behaviors in Structured Space." Paper presented at Milwaukee, Wisconsin, EDRA 6, Spring 1975.

"Children and Their Environments: A Missing Factor - Information," paper presented at EDRA 5 Conference, Spring 1974.

Publications, Papers and Projects:

"Environments for Handicapped Children: Design Guidelines", a book describing the potentials of environmental interventions with specific guidelines for accomplishing educational objectives. Partially funded by grant from National Endowment for the Arts, 1980 ($6,500) to be published 1981.

Housing Alternatives in Gainsboro, with Sharon Booker. A book describing graphically the options available to a low-income area of Roanoke, Va. Partially funded by grant from National Endowment for the Arts, 1980 ($3,500).

"On Owning A Piece of the Rock: Participatory Planning and Design," Hatch, Richard, ed., in Columns: Architecture and Society, No. 1, Van Nostrand Reinhold & Co., Fall 1980.

Environments for Visually Impaired Children: Design Guidelines, in process, to be published by AAPHERD, Washington, D. C., 1980.

First Baptist Church Pattern Book, Fall 1979, describes participatory process, methods and program for new building in patterns.

"If I Can't Dance, I'm Not Coming to Your Revolution: The Process of Research Application," Proceedings for Conference on Research in Behavioral/Environment Studies, 1977, University of Wisconsin, Madison, Wisconsin.

"Direct Methods for Observing Child Environment Interactions" with Coryl Jones in Weideman, et al., Priorities for Environmental Design Research, Washington: EDRA, 1978.

"Behavior/Environment Interaction Patterns: Object Complexity, Natural & Design Environmental Factors and Children's Spontaneous Play" in Weideman, et al., Priorities for Environmental Design Research; Washington: EDRA, 1978.

"Late Fall Prairie," Super 8 movie.

"Downtown in Five," Super 8 movie depicting young children in an urban environment, their needs and patterns of interaction and resources available in the environment.

Selected Community Involvements:

President of the Board, Blacksburg New School, an alternative educational program for children 5-10. 1978 - 80.

Organized Participatory Playground Design and Construction, Blacksburg New School, Summer 1978.

Consultant and Designer, Blacksburg New School, for redesign for their facilities. Summer 1977.

Talent Bank, in the development of Safety Standards for playgrounds for the Consumer Products Safety Commission by the National Recreation and Park Association, 1975.

Board Member, After-School Day Care Association, Madison, Wisconsin, 1975.

Parent Child Center, Madison, Wisconsin. Assisted in founding a community parent cooperative for children 9 months to 4 years, 1972.

Scholarships and Honors:

May 1975	American Society of Landscape Architects. "Certificate of Honor for Excellence in the Study of Landscape Architecture."
1/73 - 5/75	Vilas Award (Scholarship)
September 1973	James Bissel, Scholarship
June 1961	George Washington University, Washington, D. C. Full Scholarship.
	Georgetown University, Washington, D. C. Scholarship.
	Valparaiso University, Indiana, Scholarship.

Professional Associations:

International Playground Association
Environmental Design Research Associates
National Association for the Education of
Young Children
World Leisure and Recreation Association
American Association for Adventure Playgrounds
Council for Exceptional Children

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201 Monticello Lane
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Urban Studies
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and State University
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VITA

PERSONAL DATA

Diane Day
1904 Lindale Drive
Blacksburg, Virginia 24060
(703) 552-9017

Place of Birth: Sioux City, Iowa
Date of Birth: March 26, 1943
Marital Status: Married, two children

EDUCATION:

1980 Doctoral Candidate, Doctor of Education
College of Education
Virginia Polytechnic Institute
and State University
Blacksburg, Virginia 24061

1980 Master of Science in Education
Thesis: "Comparison of Motor Proficiency Level to Observed Gross Motor and Manipulative Behaviors of Blind, Partially Sighted and Sighted Children During Unstructured Free Play."
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061

1966-1970 Graduate Studies
California Polytechnic State University
San Luis Obispo, California

1965 Bachelor of Science
Major: Physical Education
Minor: Fine Arts
Morningside College
Sioux City, Iowa

PROFESSIONAL EXPERIENCE:

1980 Instructor
Division of Health Physical Education and Recreation
College of Education
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061

1979-1980 Project Director
"Comparison of Environmental Interaction of Unusually Handicapped and Sighted Children." Funded by Bureau of Education for the Handicapped.

1978-1980 Graduate Teaching Assistant
College of Education
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061

PROFESSIONAL EXPERIENCE: continued . . .

1978 Project Director
YMCA Garden Project for Elderly
Funded by Department of Health, Education and Welfare
Blacksburg, Virginia 24060

1977-1978 Assistant Director for Special Programs
YMCA
Blacksburg, Virginia 24060

1974-1976 Director
Adult Continuing Education Program
YMCA
Blacksburg, Virginia 24060

1976-1978 Elementary Physical Education Leader
Blacksburg New School
Blacksburg, Virginia 24060

1974-1978 Tennis Instructor
Blacksburg Recreation Department
Blacksburg, Virginia 24060

1968-1973 Department Chairperson
Girls Physical Education Program
Santa Maria High School
Santa Maria, California

1966-1968 Physical Education Teacher
Santa Maria High School
Santa Maria, California

1965-1966 Physical Education Teacher
Alisal High School
Alinas, California

PRESENTATIONS AND WORKSHOPS:

"Design Guidelines for Environments for Visually Impaired Children" workshop for training staff in Technique of Evironmental Intervention, International Council for Exceptional Children. Philadelphia (April 25, 1980).

"Use of Environments: An Active Tool in Learning"; training in use of environments for teacher and staff. Project Imprint Convention. Fairfax, Virginia, (March 28, 1980).

"Strategies for Environmental Interventions for Visually Imparied Children" workshop for teachers in using the environment to support developmental needs of visually handicapped children. State Council for Exceptional Children. Arlington, Virginia, (March 21, 1980).

"Strategies for Environmental Intervention" training workshop for teachers and staff at Virginia School for the Deaf and Blind. Stantin, Virginia, (January 26, 1980).

PRESENTATIONS AND WORKSHOPS: continued . . .

"Play Environments for Visually Impaired Children" slide presentation, International Conference for Exceptional Children. Dallas, Texas (April 22, 1979).

"Awareness of Space and Use of Body Parts In Educational Games" workshop for teachers in movement concepts of space as it relates to games. Virginia Association of Health Physical Education, Recreation, and Dance. Norfolk, Virginia, (December 1, 1979).

CERTIFICATION:

California Secondary Teaching Credential (lifetime).

MEMBERSHIPS:

National Education Association
Virginia Association for Health, Physical Education, Recreation and Dance
The Council for Exceptional Children